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# CITY LANDSCAPE AND ENVIRONS
## A CULTURAL ECOLOGICAL PERSPECTIVE

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(A case study of flood prone area of Bharatpur)

**G. P. GUPTA**

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*Dedicated*
*to My Brother*
*(Late) Shri Laxman Prasad*

# Preface

A broad view of cultural development of humankind on earth and phenomenal changes in the cultural landscape of the towns and cities have been modified and reshaped during the period of human occupancy. The marked changes in the cultural landscapes of Indian cities have been brought about a little later especially since Independence. These cultural landscapes are coming up with radical changes due to the impact of immigration of displaced persons, rapid industrial development and advancement of technology in the country. The population explosion and varied urban activities, the increasing demand of residential houses, space for industrial and commercial establishments and transport and communication as well as the new science and technologies all have transformed the cultural landscapes of cities and towns.

The book entitled "City Landscape and Environs-A Cultural and Ecological Prespective " broadly falls under the realm of cultural geography. It deals with the townscape comprising the natural and cultural conditions responsible for the establishment, growth and development of Bharatpur. It also deals with its site, situation, location and its impact which attracted the early settlers to form the nucleous of original settlement. The study further reveals how thereafter the population and areas limit with the increase of various functions of the landscape and gradually acquired the present form of cultural landscape. In any cultural landscape of the town there is a close association between the dwellers and cultural field. The study of the different functions is an index to its multiferious development both in time and space. It also looks upon the future trends of development. It also enables the study of city environs, the area which is socially, economically and culturally linked to its central city.

The evolution to townscape of Bharatpur is related with the physical setting of an area which is known as the locality at the confluence of the waters of the Ruparail and Banganga rivers. The cultural landscape of Bharatpur and its environs has been flood-prone since long, because it was built and developed under inland drainage conditions. How in the bad drainage the landscape of the city and its environs developed and created problems in spatial pattern is the subject matter of this book.

Bharatpur city, founded by Maharaja Surajmal in 1733, is situated about 204 metres above m.s.l. (Laxman Mandir) possessing many ruined houses, temples and a massive fort.

The city is circular in shape and contains many old building which were constructed at the time of fort. An analysis of the varied push and pull factors along with complex historical events which have an impact on the growth and internal structure of the city, leads to the conclusion that the city has developed in its totality.

The text is organized around four major themes: cultural area, cultural ecology, cultural integration and cultural landscape.

In additon to these four themes, a number of other elements have also been discussed in each chapter. It has been tried to cover the whole growth and development of the cultural aspects of the landscape in a compact manner by dividing the studied material into ten chapters. The introduction deals with the location, site, situation and climatic conditions of the region. Chapter II surveys the city in time and space. In chapter III an attempt is made to show the demographical analysis of Bharatpur city and its environs. The IV chapter reveals the residential landscape and the settlement distribution. It is followed by chapter V dealing with commercial landscape and its retail distribution. Chapter VI deals with industrial landscape and the rural economic change. Chapter VII is about social amenities. The next one is about drainage system and flood hazard and chapter IX studies the religious landscape and the other land components. The last chapter gives conclusion regarding problems and planning.

The main objective of this study is to know the various functional landscapes of the Bharatpur city and the relationship between the city and its environs through many variables like demography, economy, society and infra-structure, the trend in areal distribution of population, economic functions by classifying the Bharatpur city and the settlements of its environs into functional types and also by describing the social amenities available in the region. Thus the study reveals the interrelationship between the Bharatpur city and its environs.

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This book is the result of my doctoral study and hence at the outset I must express my deep sense of gratitude to Prof. Indrapal, my research guide.

I am grateful to Maharaja Man Singh for disseminating facts and valuable suggestions regarding historical portion of the work. I owe a great deal to Dr. Sugan Chand Kalwar who offered several advices in the initial stage of my work. I would like to express my thanks to younger brothers Shri Kamlesh Gupta, Shri Ashok Khandelwal and Shri Hariom Gupta for their skilful assistance in photography and data collection during the course of my field work. My thanks are also due to my wife Mrs. Geetanjali Gupta who helped in data processing. I am especially indebted to Dr. R.S. Agrawal, Dr. S.D. Gupta and my elder brother Shri R.A. Khandelwal for helping me at various stages. I express my sincere thanks to Shri I.L. Jain, the publisher of this book.

Jaipur G.P. GUPTA

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# ABBREVIATIONS

| | | |
|---|---|---|
| Km | - | Kilometre |
| m | _ | Metre |
| T | _ | Table |
| Fig. | - | Figure |
| Appe. | _ | Appendix |
| R.S. | _ | Railway Station |
| C.B.D. | _ | Central Business District |
| N.H. | _ | National Highway |
| No. | _ | Number |
| Govt. | - | Government |
| R.H.B. | - | Rajasthan Housing Board |
| Cimmco | - | Central India Machinery Manufacturing Co. |
| G.E.W. | - | General Engineering Works |
| Hec. | - | Hectare |
| R.S.E.B. | - | Rajasthan State Electricity Board |
| U.I.T. | - | Urban Improvement Trust |
| Org. | - | Organization |
| Coop. | - | Cooperative |
| C.F.C.D. | - | City Flood Control Drain |
| * | - | At 1 per cent level of Significance. |
| ** | - | At 5 per cent level of Significance. |

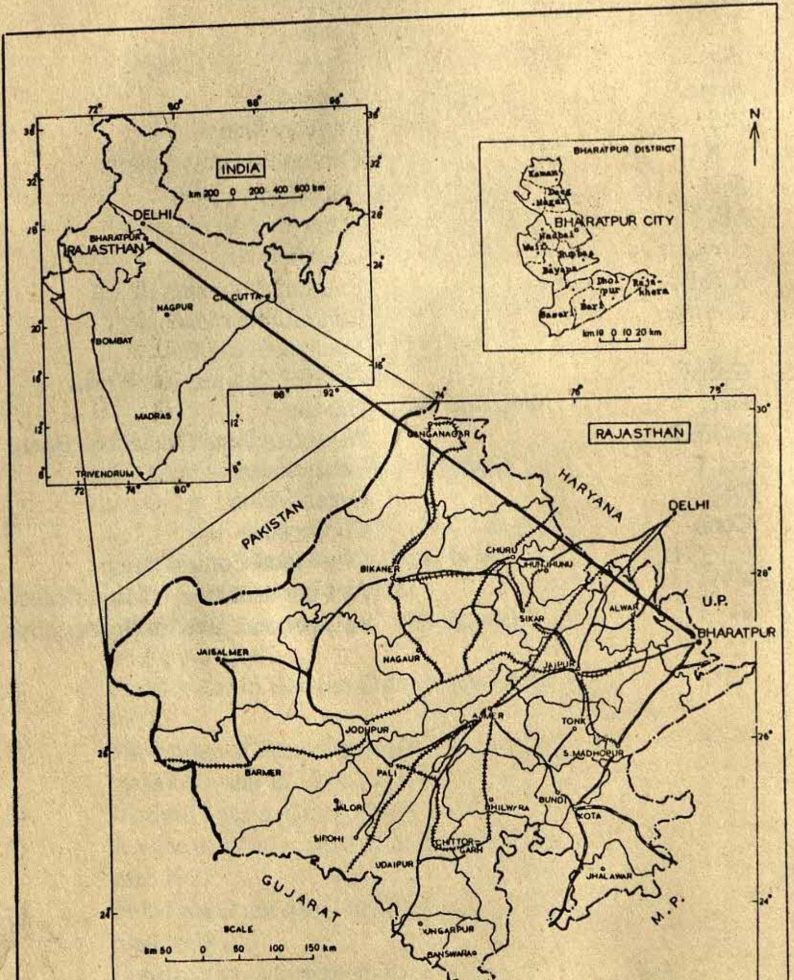


*Fig.* 1-1 Location of Bharatpur city in India

# 1

# INTRODUCTION

Bharatpur with its memorable past was the capital of the former state of Sinsinwar jats. The evolution of its townscape and environs is related to the physical setting of flat low lying area which is covered with the alluvial soil spread by the flood waters of the Ruprail, Banganga and the Gambhir rivers. The waters of these rivers are being stored in the Motijhil about 1.5 km to the north of the city and in the Ajan bandh and Atal bandh south of the city. Bharatpur city is situated on $27^{o}$ 13’ north latitude and $77^{o}$ 30’ east longitude. It occupies a very significant location on both the metre guage and broad guage of the western railway. The city is surrounded by important cities like Delhi 177 km to the north, Agra 58 km to the east. Mathura 35 km in the north-east and Jaipur 177 km in the west. It is also referred to as the eastern gateway of Rajasthan. National highway No.11 between Agra and Bikaner passes through Bharatpur. It is served by a number of highways, those from Delhi to Bharatpur and Agra and Fatehpur Sikri to Jaipur, being the important ones. It covers an area of 34.8 sq km and is situated at a height of 204 metres above sea level. (Fig. 1-1)

## The Environs of Bharatpur City

City environs is a geographical entity. It is the area which is socially, economically and culturally linked to its central city and which extends all around the city itself. The links between the city and its environs are developed through the exchange of industrial goods, and agricultural commodities produced within it and also various central functions of the city. Therefore, by virtue of its intensified concentration of central functions it commands an extensive tributary area of heterogenous character. Within this tributary area or environs, the degree of influence decreases with increase in the distance from the city. It is necessary, therefore, to identify the special limit or regional boundary upto which the topography falls within the direct impact of the city of Bharatpur. (Fig. 1-2)

The environs supplies to the central city such essential commodities of daily needs like vegetables, foodgrains, industrial raw materials, etc., whereas the central city performs educational, medical,

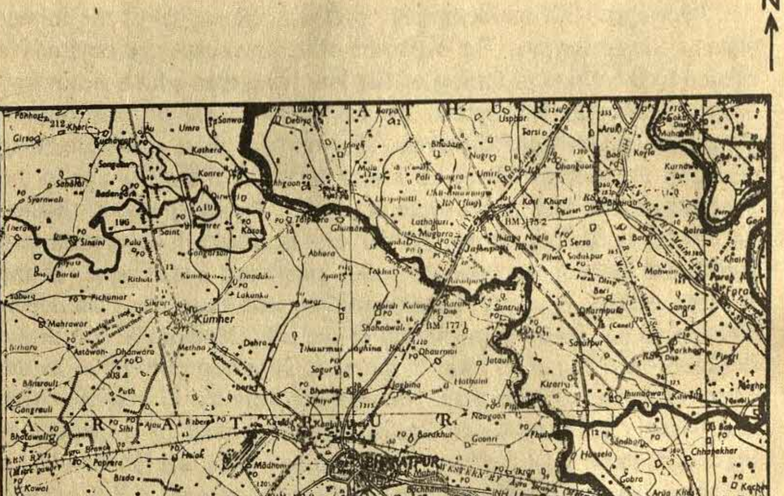


*Fig.* 1-2 Bharatpur city and its environs commercial and cultural functions for its environs which is supported by transport linkage.

The interaction between the central city and surrounding rural environs brings about a change in the land of the rural population. Density of population, decadal population variation, dependency ratios, percentages of literacy, non-agricultural workers and social amenities go on decreasing with every increase in distance from the central city which means distance decay functions. This shows that they are dominant in the core area and along the transport network. Certainly the sex ratio and primary workers go on increasing with the distance away from the central city. The study of the secondary data on the aforesaid variables reveals that Bharatpur influences the demographic and economic variables of the urban-environs. An area within a radius of 24 km around the city has been selected for the study. An analysis has been done on village level. The entire environs consists of 539 villages and a town namely Fatehpur Sikri. (Fig.1-3) It is now universally established that a city does not exist in vacuum. It is rather intimately related to area surrounding the city which is larger than the mere site it occupies.

It stamps its influence on its environs in respect of habitat, economy and society. Thus the growth of the city is linked with its environs which shows some task that has to be performed by the city. As such, a city can not be economically, socially and physically planned in isolation from its surroundings, i.e. rural environs. Therefore, it is essential to determine the geo-social characteristic of Bharatpur and its environs.

## The Natural Landscape

The natural landscape is the visible portion of the natural environment. It consists of land forms, soils, water features, natural vegetation, native animals and so on. It also includes the direct and indirect products of climate and some of those ground water. It may or may not reveal some of the implications of rocks and minerals and natural resources. Thus, not all elements of the environment are visible in the natural landscape. The natural landscape is relatively constant. The process of work in the natural landscape produces constant changes and it is so slow that for geographical purposes they can be

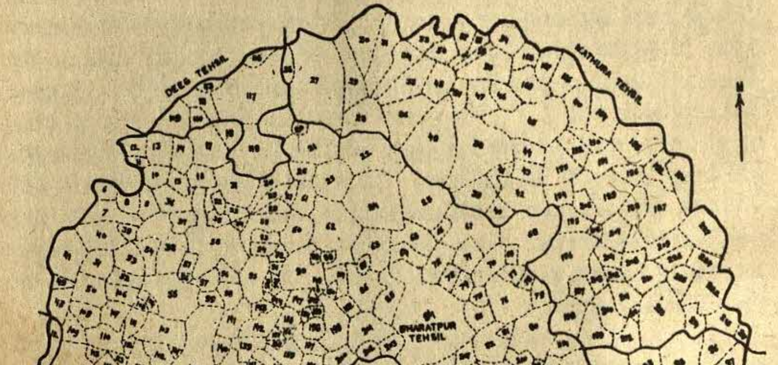


*Fig.* 1-3 Showing number of settlements in the city environs largely ignored. Thus the natural landscape may be studied according to the following implications[1].

## Topography

Topographically, the environs of Bharatpur is plain and levelled. The terrain of south-east is considerably difersified by hills. There is a dense forest called Ghana within a distance of about 5 km from Bharatpur city, which remains green during rainy season. Mandhera is the open jungle situated towards the north-eastern periphery of the area. Further, to the north the landscape slopes to higher levels, the alluvial deposits become deeper, level ground is more frequent and hills stand out more markedly while in the neighbourhood of Bharatpur town the low ground is cut into labyrinth of ravines. There is one hill named Mandholi, a hill lying to the east of Bharatpur city is 216.10 metres above sea level. The region can be divided into three topographical units, viz.1) Vast plains occupied by alluvium, 2) highly dissected sand hills forming bad land and 3) long low-lying flat-topped hill ranges depicting penultimate slop of denudation. The southern area of the region falls within the flood plain of the Banganga river. Alluvial deposits are seen along the Banganga and Ghambir rivers which belong to the Chambal system. The drainage is mainly inland. Strong to severe sheet and gully erosion, salinisation and localised sand advances are observed.

There is a gradual fall from the north and south-west towards the city of Bharatpur. The main slope of an area is, however, esterly towards the junction of the Yamuna and Chambal rivers, the fall in this direction being about on an average of 0.93 metres per km. The environs of Bharatpur city is neverthless readily drainable by cuts bending in a south-easternly direction towrds the Khari river, tributary of the Chambal river which is the destination of all the drainages escaping from the area. With much uncontrolled floods, the environs of the city would lie in water throughout the greater part of the year, but is now possible to keep the flood water in control. If there is any surplus water in the depression after filling the fort most, it is drained off in a south-west direction by means of an underground masonary channel passing through the city.

## Major Water Bodies

There are only two major waterscapes in the city environs, viz. Motijhil and Keola deo jhil. The former is situated behind the palace of

Maharaja Man Singh, about 1.5 km north-west of Bharatpur city. It is the storehouse of flood water which comes from the northern environs and used for irrigation purposes. Keola deo jhil, famous for duck shooting, is situated about 5 km south of Bharatput. On 15th July 1980, the water levels of these jhils were measured and found nearly one-third of their full tank guages[2]. It is due to lack of rainfall.

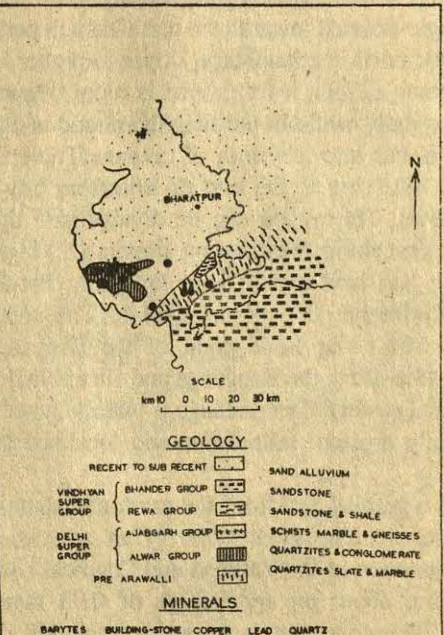


*Fig.* 1-4 Geology of Bharatpur city and its environs

**Geology**

Much of the area is covered by alluvial soil and blown sand of recent to sub-recent age. In the south-eastern part, the vindhyan rocks occurs in the range which runs from Fatehpur Sikri towards Hindaun. The hills, west of Bayana are formed of quartzite sand-stone interstratified with trap and shale. The hill in the western side of the region, represents the geological formation of Delhi system. The general sequence of the Delhi system is quartzite, shale and trap, the rock types continue from Bayana to Weir tehsil and further onwards to Bharatpur. The Vindhyan sandstone with white streaks is scattered all over it. (Fig. 1-4)

## Mineral Wealth

The Vindhyan sandstone formations cover most of the rocky parts of the region. The sand stone is being used as building material. Many important buildings like temples were made of red sandstone. Alkali salts mostly in the form of potassium nitrate are collected in large quantities from the area north of Bharatpur. The other minerals occurring in the district are barytes, copper, mica, silica sand, clays, gypsum, iron ore, lead ore and mangenese. The deposits of these minerals appear to be very small and not of much significance.

## Floral Composition

Anogeissus pendula (Dhok) and Acacia catechu (Khair) are the main species in the region. The forests are generally irregular and situated on hills, usually on rocky or stony slopes or gently undulating grounds. Ghana block has fairly dense mixed jungle mainly babul (Acacia milotica). The associates of babul in Ghana forests are Mitragyria parviflora (Vadam), Zizyphus maruritiana (Ber), Acacia leucophloeo (Arunj), Prosopis juliflora (kabulia Kikar), Salvadora parsica (Chhotapilu), Capparis sepiaria (Hins), Cappris decidua (Karil or Kair) and Balanites aegyptiaca (Hingot). Babul and Karil are the important trees at the Motijhil area.

Mandholi hills lie to the east of Bharatpur city, on which important trees are found like Karil, Papri, Neem, Pipal and Chonkra. The dense forest is also observed on the banks of the Agra canal, Govardhan drain, Fatehpur Sikri drains and Gambhir river which include mainly Prosopis spicigera (Khejra), Salmalia malabarica (Semal) and Acacia catechu (Khair). Khair trees in these forests are generally stunted, poor and openly grown at the height of 3.5 metres.

Among the grasses the important ones are Iseilema laxum, Eremopogon fovelatus, Dichanthium annulatum, Heteropogon contortus, Dismostachya bipinnata, Cenchrus species and Vetiveria zizanicoides (Khus). Khus is widely produced in the Ghana lake.

**Fauna**

The entire region is known for its duck shooting. Geese, ducks, teals pintaits, Siberian cranes, palicans and other varieties of birds migrate to this area during winter. Local birds are mainly painted storks, cormorants, sarascranes, spoonbills, crows and weaver birds[3].

The carnovora found in the region are tigers, panthers, jackals, fox and jungle cats. Other animals are bear, spotted deer, black buck, chital, chinkaras, blue bull, sambhar and hare.

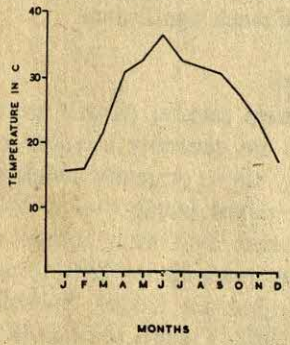


Fig. 1-5

Bharatpur mean monthly temperature

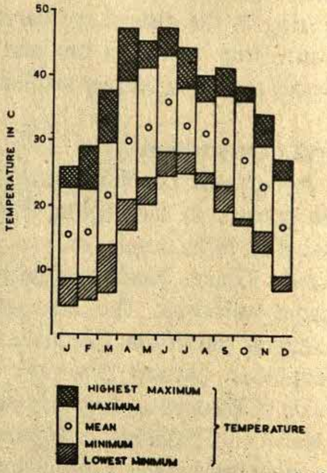


Fig. 1-6

Bharapur temperature variations

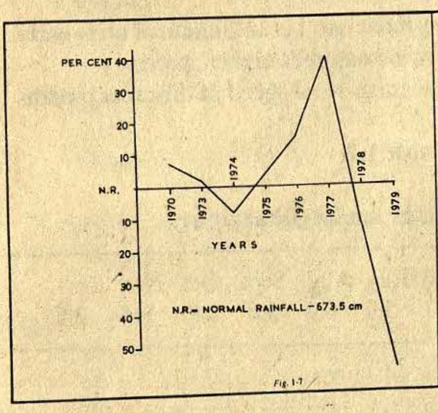
Different snakes, cobras and phythons are the important reptiles. In Ghana, a very large number of saras, cormosant, snakes, birds, egret, heron, storks, etc., arrive in the monsoon for breeding.

**Climatic Conditions**

The region has a semi-arid climate with a hot summer, a cold winter and a short monsoon season. It is observed that the cold season prevails by about the middle of November to the beginning of March, the hot season follows thereafter and extends to the end of June and the monsoon season is between July and mid September.

### Temperature

Temperature increases from March to June. May and June are the hottest months of the year. (Fig. 1-5) Sometime the maximum temperature reaches 47° C and above in the month of June and, therefore, the heat becomes intense and scorching, dust laden winds add to the discomfort. After the withdrawal of monsoon by mid-September, days become a little hotter, but the nights become progressively cooler. Both day and night temperature decreases rapidly from November to January.
(Appendix O-B)



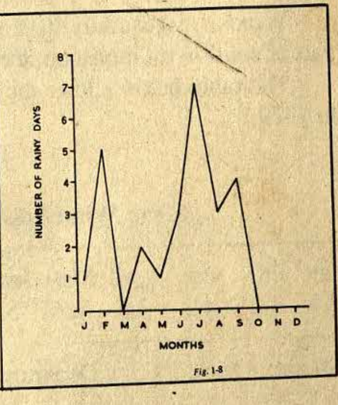


*Fig.* 1-7 Bharatpur deviation from normal rainfall
*Fig.* 1-8 Bharatpur mean monthly rainy days

### Rainfall

The rainfall during the south-west monsoon season constitutes about 81 per cent of the annual rainfall. The variation of the rainfall from year to year is large. In the fifty years period from 1901 to 1950, the average rainfall was 67.15 cm in the environs of Bharatpur city (Recorded at Bharatpur). Appendix O-C gives the normal and actual rainfall of Bharatpur from 1970-1979.

Figure 1-7 reveals the highest rainfall of 948 mm in the year of 1977 when there was a heavy flood in the whole environs of Bharatpur and the lowest rainfall of 283.9 mm in 1979. The highest rainfall and maximum number of rainy days are confined to the month of July. (Fig.0-8) The highest rainfall recorded on 15th July was 581 mm.

## Relative Humidity

During the south-west monsoon season the relative humidity is observed over 70 per cent. The average humidity of January measures 79.9 per cent. (Appendix-O-D) In the rest of the year, the air becomes dry. In the month of June, which is the driest period of the year, in the afternoon relative humidity goes down to 30 per cent or less.

## Winds

Winds are generally light to moderate but in Summers or in early part of south-west monsoon, the wind assumes nigher speed.

The table below shows the average wind speed of different months in 1979 :

**Table 1-1**

**Mean Wind Speed in km/hr (Bharatpur)**

| Jan. | Feb. | Mar. | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.9 | 3.0 | 4.2 | 3.6 | 4.5 | 5.7 | 5.9 | 6.9 | 3.8 | 2.8 | 2.4 | 2.5 |

Source :- Meteorology Department of Jaipur.

## Cloudiness

During the south-west monsoon skies are moderately to heavily clouded generally and overcast on some days. In the rest of the year, clear or lightly clouded skies prevail.

## Ground Water

In the south-west greater part of the lower Banganga basin, ground water occurs in the unconslidated to poorly consolidated quaternary sediments. The water table of the near-surface ground water body in the area lies at the shallow depth. In a wide belt expending parallel to the river the depth of water table is less than 6 m. This belt extends upto the Ghana lake. In an area of about 200 sq km the water table lies at depths of less than 3 m. The three deep bore holes in the eastern part of Bharatpur town gave free flow varying from 9,000 to 45,000 litres per hour from aquifers between the depths of 102 and 121 metres. It is likely that such flowing conditions may extend to low lying areas around Ghana lake.[4] The eastern part is covered by alluvium where the depth of water table is 5 to 10 metres.

### Solar Radiation

Global solar radiation is the principal component of the radiation balance and the most important in understanding the different physical processes taking place in the atmosphere and on the earth surface. Annual.global solar radiation over an area is 460 Cal/Cm$^2$/day. The following table shows the solar radiation in the different months[5].

| Month | Global Soiar radiation |
|---|---|
| January | 370 Cal/Cm$^2$/day. |
| April | 620 " " " |
| July | 460 " " " |
| October | 470 " " " |

In January the region gets 370 Cal/Cm$^2$/day while the western region of Rajasthan receives only 30 per cent of the above.

### Street Pattern

Geographical analysis of the evolution of Bharatpur clearly shows that the walled city has a distinct evolutionary stage in its street pattern, while extra-walled city has developed an iron grid pattern in some areas.

Many roads coming from outer regions exhibit a tentacular system within the municipal limits. The main roads are those leading to Jaipur, Agra, Goverdhan, Kumher, Mathura. All these roads meet the principal gates and coverage at the Mathura gate bus stand.

Irregular cob street pattern is clearly marked in the whole of the walled city except the main roads. The surface is generally undulating and has a gentle slope towards the core of the city and further to the Nadia mohalla which is the lowest residential part of the walled city. This street pattern is mainly in the residential area.

Throughout the walled city the streets are very narrow without any foot-path and the lanes are even narrower, i.e. only one metre wide. These lanes are generally named either after the names of their prominent residents or predominant caste or a particular type of occupation in the streets. Namak-ka-katla has been a predominent centre for the trade of salt. Now rope work is an important function there. So, it is called Moonjwalo-ka-mohalla.

The rectangular street pattern is clearly marked in Rajendra nagar, Ranjeet nagar, Krishna colony and Housing board colony. Here the roads are comparatively wider/and well planned. Mostly single storey buildings are found in these colonies.

## The Drainage System of the City

Wherever the drainage system exists, it consists of many shallow open drains running either inside or in the centre of the streets or lanes. The drains have no proper gradient and their courses are irregular. It seems that they have been constructed without any consideration for the purpose for which they are meant and therefore serve only as such. Generally the main drains of the houses have their outlets at the door fronts where the road side drains have been provided. Many of the houses have latrines at their front side, sometimes dirty water overflows on the main roads and makes the lanes very filthy.

Inside the city wall the condition of the latrines is bad and insufficient in number. Except the marketing centres the roadside drains are used as open-air lavatories by the children and the circular road is used as latrines by the grown-up persons because the water is available in the outer most of the city. The dust-bins are not on the roads so the people dispose off their house refuge on the roadside. The animals, children, the horses of tongas cover the roads with refuge. But during the rainy season the whole city gives a bad smell. The waste is carried by the rain water to the outer most of the city and from the central part to the Nadia mohalla.

The new colonies are thinly populated. The drains, in front of the houses are generally marked in the large open area. However, there are no proper drains throughout the city.

## Sewage Disposal

There is an open drain system in Bharatpur city. The drains lying by the sides of the roads generally get road dust, silt and refuge which obstruct the smooth flow of sullege water. The ultimate disposal of the major portion of sullage is arranged according to its location.

(1) Sewage disposal of the houses, situated around the fort is carried in the fort moat

(2) Sewage disposal of those houses which are in between the fort and circular road, is deposited in the pits, near the residential areas.

(3) The houses near the outer most of the city carry their sewage disposal to the outer most.

(4) The sewage disposal of Ranjeet nagar, Railway colony and Krishna nagar comes to Girraj canal.

(5) Sewage disposal of the Malgodown road is also carried to the Girraj canal.

Thus the sewage disposal of the city is mainly carried either in the outer most, inner most or the Girraj canal.

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## 2

# THE CITY IN TIME AND SPACE

Bharatpur, the eastern gate of Rajasthan and resplendent in colour and grandeur, was the capital of the former State of Sinsinwar Jats[1] whose deeds of valour have been woven into the tapestry of the Indian medieval history. Its formidable fort is better known as the Lohagarh of Bharatpur in the folk songs[2] of the country.

According to Thornton, Bharatpur was probably founded in the early part of the eighteenth century when jats of this part of India were becoming powerful. At that time there were two Jat groups Churaman Jat group and the Rustam Jat group. Churaman built a fort at Thoon then the district of Nagar and conquerred Deeg, Kumher and other villages in the neighbourhood. Rustam lived at the same time at Tihya village about two miles from the present site of Bharatpur where he built a small mud fortress having a gate facing north, four bastions and a moat around it and set as a freebooter. (Fig.2-1) He sent his son Khemkaran to Churaman at Thoon to induce him to come and join him. Thus the group became larger in proportion.

Farrukhsiyar, the king of Delhi (A.D. 1713 to 1720) hearing the distrubed state of the country, gave Churaman the title of 'Bahadur Khan' with a jagir of five parganas, Nagar, Kathumber, Nadbai, Ow and Helak and at the same time gave Khemkaran the title of 'Bahadur' with a jagir consisting of the pargana of Rupbas and the villages of Bharatpur, Malah, Agahpur, Barah and Ikrun. Now Khemkaran became the master of the mud fortress of Bharatpur.

For a systematic study of the evolution of the city, the history may be divided into three periods:

(1) Early period (1733-1826 A.D.)
(2) British period (1826-1947 A.D.)
(3) Modern period (1947-up-to-date)

Churaman's elder brother, Bhao Singh lived in Deeg. He had three sons, Ajairam, Rupa Singh and Badan Singh. The first two were killed by Swai Jai Singh of Jaipur, in the two successive expedition to Deeg. Thus Badan Singh the younger brother of Rupa Singh became the head of the sinsinwar family. He adopted his nephew, Surajmal (1707-1763) and who later created history by his remarkable statesmenship and great warrior qualities. In this way Surajmal became the successor of the clan.[3] He led several compaigns and expanded the Jat State. In 1733 Surajmal made a night attack on the mud fortress of Bharatpur, killed its master, Khemkaran. Hence, with the occupation of Bhartpur Surajmal changed the centre of Jat activities from Deeg to Bharatpur and this paved the way for expansion of this state towards south-eastern side. After destroying the mud fortress, he erected another larger stone fort by its side, all masonary and of square dimensions. (Fig. 2-2)

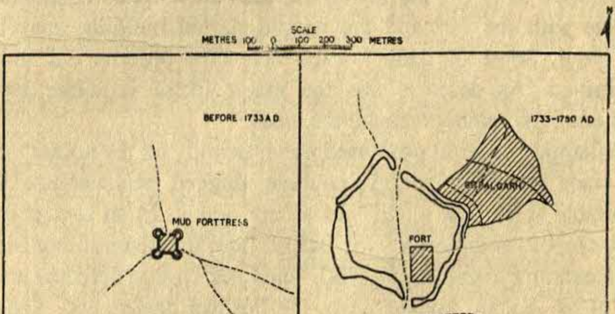


*Fig.* 2-1 Evolution of Bharatpur city before 1733
*Fig.* 2-2 Bharatpur city in 1733-1750
*Fig.* 2-3 Bharatpur city in 1750-1800

The fort was surrounded by high walls and a deep moat about 200 feet wide. It has two gates - one to the north called Asht dhati and the other to the south called Chouburja gate.[4] A bridge was thrown across the moat at each gate. It contains many houses, temples, Mahal khas and eight bastions5 the whole construction work completed by 1756 A.D.

The present Bharatpur city has developed outside this fort. Gopalgarh is one of the four early mohallas (Gopalgarh, Kishangarh, Nawalgarh and Govindgarh) was founded by his father Badan Singh to the north east of the fort in 1743. Surajmal himself laid the foundation of Kishangarh, mohalla in 1756 to the south-west of the fort. After the death of Badan Singh in 1755, Surajmal ruled as full-fledged Maharaja of Bharatpur state till his death. He also built roads connecting the mohallas with the fort and the people started building their houses along them. Some of these houses have now become old and some have ruined. As defence was the major factor in these days, the settlement grew mainly arround the moat.

Maharaja Surajmal possessed pre-eminently all the nobler qualities of his race including energy, courage, dogged perseverance and an indomitable spirit that would not accept defeat. In an age of intrigue and unscrupulous diplomacy, he baffled both the dissembling Moghuls and the cunning marathas. In 1760, when Dattaji was defeated and slain in Delhi by Abdali Ahmad Shah, the Peshwa despatched, Sada Shiv Rao to command the forces against Ahmad Shah. He was joined at Chambal by Surajmal, who, however, advised Bhao Sahab to park his baggage and artillery at Bharatpur and then start guerilla operations in the traditional Maratha fashion against Abdali's flank and read and avoid a pitched battle. Advice which was comtemptuously rejected by the latter as "the chatter of goatherds and Zamindars". But the confrontation finally proved disasterous to the Marathas. When Abdali Ahmad Shah turned his eyes towards the forts of Bharatpur, Deeg, Kumher and Weir, Surajmal wrote a letter to the Shah which is undoubtedly a brilliant document: I "I have no important position and power in the empire of Hindustan. I am one of the Zamindars living in the desert. Now that a powerful emperor like your Majesty determined on meeting and opposing me face to face in the field of battle... that action alone would be discreditable to the dignity and greatness of the Shah... the ultimate result is not altogether free from uncertainty... the truth about the forts belonging to me, the object of your wrath, which have been regarded by your Majesty's web, shall be tested only after an actual fight. God willing they shall be (as invincible as) Alexander's ramparts". Ultimately Abdali did not invade Bharatpur and back to Kabul. Surajmal was finally shot down in a battle against Najib Khan in 1763 near a nullah where the Ruhela Musketeers lay concealed. One of the Ruhelas called Sayyed Khan recognised him and plunged his dagger twice or thrice into Surajmal's stomach. He also ordered the head to be cut off. Surajmal was remarkably secular for his times and gave Muslims important positions, although he was given the title of Brij Bhusan for protecting the holy places of the Hindus at Mathura, Gokul, Vrindaban and Goverdhan. He also refused to demolish mosques. He was too astute a statesman to think of an exclusive and intolerant Hindu Raj.[6]

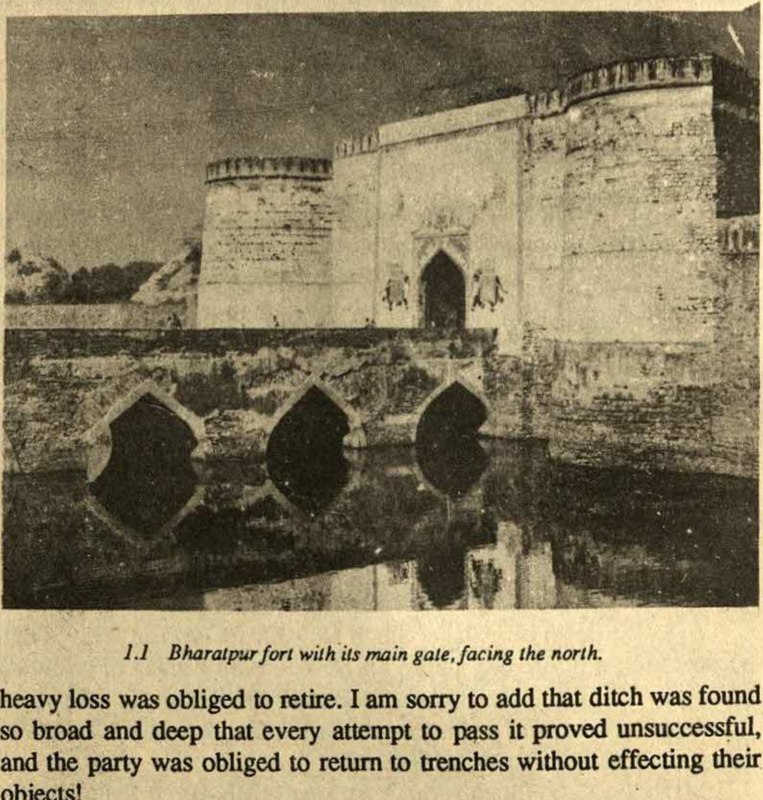
Jawahar Singh, the eldest son of Surajmal sat on the throne in 1763. He possessed unbelievable valour and bravery. He moved to Delhi in 1764 and plundered the city and carried a rich booty to Bharatpur, Aasht Dhati gate was also looted and placed at the northern entrance of the fort. To commemorate this victory he built Delhi gate at a distance of 200 metres to the north-west of the northern gate of the fort. The settlement which developed from Delhi gate towards the moat is called Pahibagh. It was formerly called Panibagh because it used to be flooded during the rainy season. The inner moat is called "Sujan Ganga". Its water was used for drinking and other purposes. He built the Jawahar bastion, the Barahadari Hamam, and other buildings. He spent his time mostly at Agra where he was murdered in 1768 in the Red Fort by a soldier who he had raised to a high rank.

After the death of Jawahar Singh his younger brother, Ratan singh, became king in 1768. But during his period nothing much of value was added to the city. He was assassinated by Rupanand Gosain at Brindaban on account of the weakness of his character. He left an infant son Keshri Singh as his successor.

Maharaja Kesri Singh became the king of Bharatpur State in 1769. But he being a child of two years, his uncle Nawal Singh, ruled the state. He constructed the awal bastion. The settlement grew mainly near the fort. During this period the main attention was given to the development of the three garhs-Gopalgarh, Kisangarh and Nawalgarh. The area of the city at this time, occupied by the settlers was 2.20 sq.km. (Fig. 2-3)

Maharaja Ranjeet Singh the younger brother of Nawal Singh succeeded in 1777. During his short rule of eight years period he opened hostilities against General Lake, the commander of the English army. He made four successive attempts, but failed to capture the fort of Bharatpur.

From the letter of General Lake to Marques Wellesley, dated 10th January, 1805, says that 'And the columns after several attempts with heavy loss was obliged to retire. I am sorry to add that ditch was found so broad and deep that every attempt to pass it proved unsuccessful, and the party was obliged to return to trenches without effecting their objects!



*1.1 Bharatpur fort with its main gate, facing the north.*

Bharatpur from 1805 was under the administration of Maharaja Randhir Singh, the son of Ranjeet singh. He enjoyed a peaceful reign of about 18 years. Fatehburj or 'Victory tower' between the Neemda gate and Anah gate was constructed in 1805 for the his victory against the British. A beautiful dargah was also constructed near this burj, called Lashkari Shah dargah. Randhir Singh constructed a court, burj and many buildings mainly Inder Bhawan inside the fort. Laxaman Rani palace was built in 1812. In 1816 he laid the foundation of Govindgarh, the fourth garh to the north-west (this area can be assumed at present between Chandpole gate and Gowerdhan gate to the fort). The area of the city at this period occupied by the settlers was 2.70 Square Km. (Fig. 2-4)

Maharaja Baldev Singh, the brother of Randhir Singh succeeded to the throne in 1823. He extended the area of the city towards the south

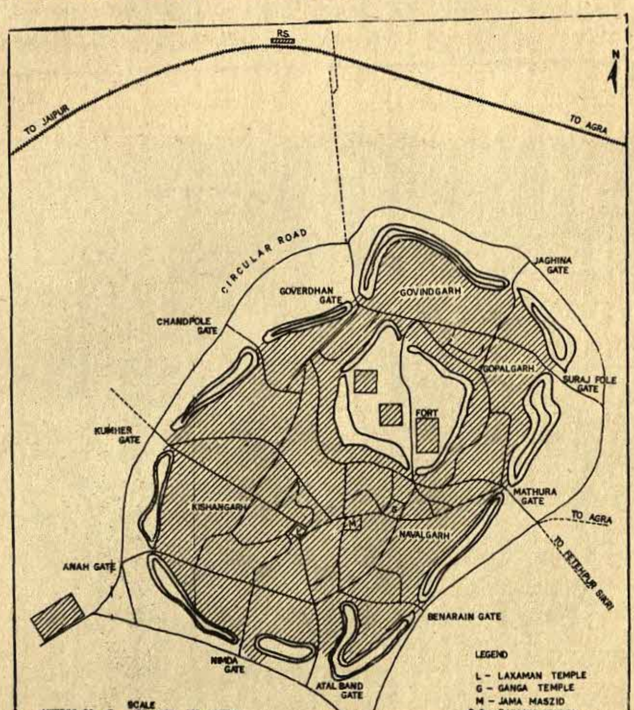


*Fig.* 2-4 Bharatpur city in 1800-1900

and constructed Laxaman mandir in the centre of the city in 1824. He masonised the other side of the moat of the fort and died in the same year. The settlement mainly grew near Laxaman mandir and the temples.

Maharaja Balwant Singh, the son of Baldev Singh ruled from 1825-1853. He had great taste for architecture. Some of the buildings of Kacheri-kalan, Kamara-khas, Kothikhas were built on English style in the campus of the fort. (Fig. 2-5) Two important buildings-Ganga mandir and Jama masjid were built by him in 1845. Every new entrant in the state service contributed a month's pay for the fund meant for constructing these buildings. Settlement spread around the temples and covered the area upto Benarayan gate. Another moat was dug outside the city wall in 1825 and the earth so dug was used for making the city mudwall. There are ten gates in this wall to enter into the city. They were also constructed in the same year.

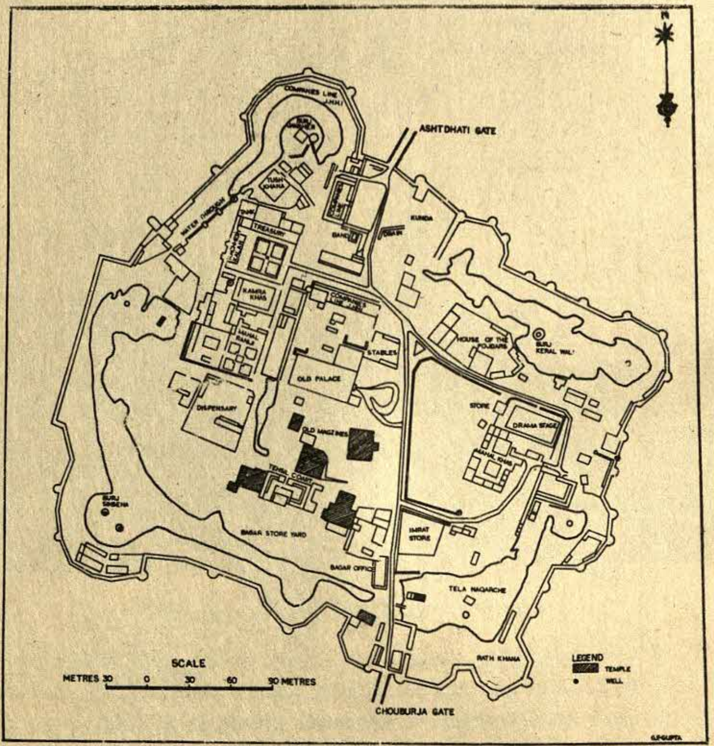


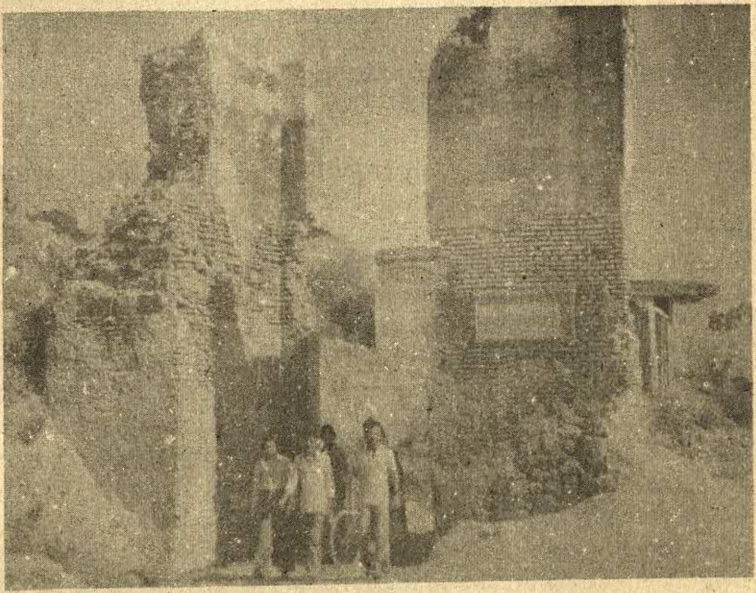
*Fig.* 2-5 Bharatpur Fort

The principal gates are:

1. Mathura gate, facing east
2. Benarayan gate, facing south-east
3. The Atal-band gate, facing south
4. Neemade gate, facing south
5. The Anah gate to the west
6. Gowerdhan gate, facing north-west
7. The Kumher gate, facing almost due west.
8. The Jaghina gate, facing north.

9. Chandpole gate facing west and
10. Suraj pole gate, facing west.

In the year of 1850, a small marketing centre developed near Chouburja, and it is called 'Chouburja market'. He died in 1853.



*1.2 Ruined Jagina gate, one entrance to the walled city.*

Maharaja Jaswant Singh was the next Maharaja who ruled the city from 1853 to 1893. He first built all the roads inside the city and then a circular road along the outer moat under the supervision of Major Morrison. It served as a bulwork to keep all the rising water from the city wall. In the year of 1865 the Bharatpur state agreed without a formal document to cede land required for railway station in the north of the city which is 3 kms. from the fort. Survey design and construction of the railway station and other requisites took about eight years and a line was opend for traffic to Agra on the 20th October, 1873 and to Jaipur on the 20th April, 1874.[7] The Sewar bund on the south-west and the Motijhil on the north-west were constructed in

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between 1865 and 1870. Shopping centres developed at the Ganga mandir and the Jama masjid.

The principal trade in Bharatpur upto 1879 was in salt. Namak ka katla was then a very wealthy and flourishing part of the city.

Maharaja Jaswant Singh inaugurated the first Jaswant cattle fair and exhibition which is held annually in the exhibition ground during the Dashahara festival, generally in the month of October. Maharaja Jaswant Singh, after a rule of over forty years, died on the 12th December 1893, and was succeeded by his eldest son, Ram Singh. Maharaja Ram Singh was set aside after a reign of two years because of his bad habits.

On the outbreak of the first world war Maharaja Kishan Singh placed all his resources at the disposal of the British government. In 1918 he was invested with full powers. During this period Ayorvedic hospital, Sarafa bazar, Inner Mathura gate and Laxman mandir shopping centres were developed.

Maharaja Brijendra Singh, the son of Kisan Singh, was very loyal to the British government and ruled the city from 1929 to 1948. In 1947 on the eve of their exit form India, the British gave back the Maharaja of Bharatpur all soverign powers of the state and made him quite free and independent. During his reign he established the boys college and Museum. The main mandi yard was built near the railway station in 1946 at a distance of two and half kms. from the fort. Previously it was purely forested area. At present there are seventy five shops in the Mandi yard. Baasan gate, Dahi wali gali, Bajaja bazar and Inner Kumher gate etc. shopping centres were developed also.

Mr. Raj Bahadur advocate, a popular citizen and public worker changed the ideas of the time and brought Bharatpur on the industrial and tourist map of India.

After the formation of Rajasthan the administration of the whole state was reorganised and with complete territorial adjustment, Bharatpur district was composed and a collector was appointed to look after the division with its headquarters in Bharatpur city. The progress and extension of the city was very slow from 1900 to 1947.

The independence in 1947 caused manifold changes in the cultural landscape of Bharatpur city. Many people migrated from neighbouring villages and settled in the city because of employment in the industries. The migration of the villagers to the city resulted in the filling up of the gaps in the settlement. Several new mohallas and colonies developed. Such as Budh ki haat, Atal band towards Benarayan gate and Anah gate areas which have been converted into shopping-cum-residential areas. New residential buildings came up out of the Mathura gate and Govardhan gate which have also converted into little shopping centres along with the greater residential area. Many other small shopping centres have developed in the city as Pahibagh shopping centres, Delhi gate shopping centre, Purani sabji mandi and New sabji mandi. Out of the city wall many other marketing centres recently came into existence; Station road, New mandi and Bajaria developed on the road running from Govardhan gate to the station. And out of the Kumher gate, the Kumher gate shopping centre and Exhibition road developed after 1972 which is known as machinery repairing or service-centre of the city. There was a roadways bus stand just outside the Kumher gate. It was shifted out of the Mathura gate in 1972.

The establishment of several new government offices and the expansion of old ones provided employment to a large number of people. General Post Office, Office of the Inspector of Schools, Employment Exchange (in Museum building), Government Girls College, office of Central Excise, Commercial Tax Office, Divisional Forest Office, Water Works, Telegraph Office, Bharatpur Zila Khadi Gramodyog Samiti, Irrigation and Under Ground Water Board, Superintendent of Police and Veterinary Hospital were developed and extended.

S.T.C. Training Centre, Coperative Training Centre, Collector's residence are recent additions to the city. Some new colonies have also developed, Railway colony near railway station and Ranjeet nagar to the west of the station road. Krisna nagar is developing near the collector's residence. Plans for new developments have also been made by U.I.T. that has proposed residential area to the west of the Ranjeet nagar and shopping centres on either side of the part of the circular road which runs from Mathura gate to the Kumher gate. Much of the agricultural area on the periphery has given way to the sprawling of the city. Out of the Govardhan gate and Mathura gate, fast construction is coming-up and urban land use pattern is also changing.

Thus by the end of 1971 the city had acquired an area of 24 sq. kms. which rose to 34.83 sq.kms. in 1974. (Fig. 2-6)

The world famous Ghana bird sanctuary and the exhibition attract the visitors, and their staying problem is being solved simultaneously. There is a dak bungalow, known as Swagt bhawan, Shanti kutir, Ghana Hotel for tourists and number of Dharamshalas, important being the

Kamsen and Agrawal dharamshalas in the city and Parusram dharamshala recently constructed in 1972 infront of the railway station.

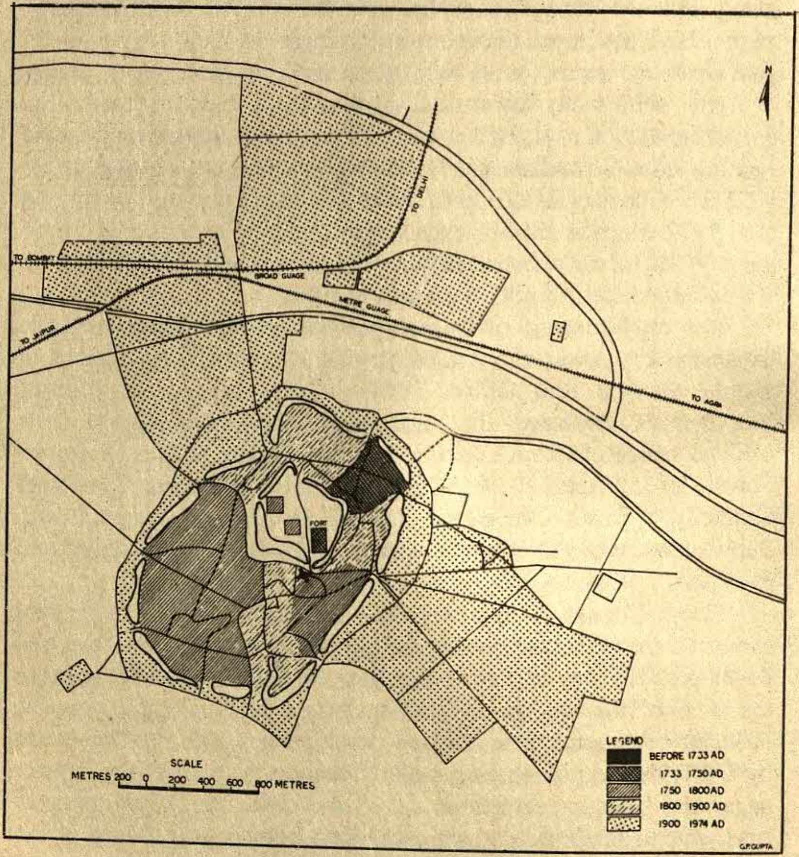

*Fig.* 2-6 Bharatput city in 1900-1974

The development of the cultural landscape of the city took place in stages. Early settlement was confined near the fort. The development of the second stage marked the expansion on the fronts except south but is was limited within the mud wall. In the third stage, the development of the city is mainly taking place out of the Govardhan gate and Mathura gate. However the fort controlled the growth and expansion of the city during all the stages.

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3. Ram Pande (1970) "A Social and Political History of the State of Bharatpur upto 1826" Thesis, Rajasthan University, Page-61.
4. Imperial Gazetter, VIII, 75-76, Rajputana 5-6; J.S. 54: just opposite the main gate of the fort, there was little fort known as Chouburja destroyed by Nagar Palika Bharatpur, for the construction of 'Maharaja Surajmal Park'.
5. Bastions: 1. Jawahar bastion, 2. Khan Douran Khan bastion 3. Sinsina bastion 4. Bager bastion, 5. Nawai bastion, 6. Bhainsawali bastion, 7. Gokalram bastion, and 8. Kalka bastion.
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# 3

# DEMOGRAPHIC ANALYSIS

Cultural landscape constitutes the forms super-imposed on the physical landscape by the activity of people who are the direct indicator and using an area effectively.[1] Hill says that landscape exposes cultural values and beliefs as well as the footprints of man. Thus the study of people on the landscape is of great and immediate interest to the geographer.

The study of the population should continue to be, an element of human geography and of regional geography but more importantly, demography as a formal and systematic subfield of the discipline places greater emphasis upon man.[2] Hettener in "Die Geographieihre Geschichte, the western and ihre methoden" by contrast with all others mentioned does clearly single out population as a prime element for Geographical study. He emphasises demography to an important position because demographic structure has a great influence on all of other geographic elements.

Cultural landscape of Bharatpur city covers an area of 22.34 sq. kms. or representing 10.24 per cent of the total urban scape of Bharatpur district and roughly one third of the total urban population. It contains 68036 persons according to 1971 census with the density of 3050 persons per sq. km.

## Population Growth

The table below shows a 90 year population growth in the Bharatpur city. Since 1881, when first population estimate for Bharatpur city was recorded, total population stood at 66,163. A decade later, it was registered a slight increase, in 1891 to 67,553 over the previous census count. In the next decade it would be found that the population decreased by 13,952 or 35.4 per cent. This appears to have been due mainly to famine which occured in Rajasthan. The area of the city was segmatised worst during the subsequent decade of 1901-1911 too. An endemic fever took a large toll of human lives. The 1921 figure, therefore, revealed a fall of 1.25 per cent in the population due to migration at the break of Jaisamand Bund of Alwar in 1918 and some people met the death at the time of Jhiri war in 1921. Again the break of Jaisamaand Bund in 1924 caused the flood in Bharatpur city and people migrated from north-western environs of the city. Thus we find a decrease in the population by 9.92 per cent in the decade 1921-31. The population of the city recorded 30,173 in 1931 which was less than half of the population of 1881. (Fig. 3-1)

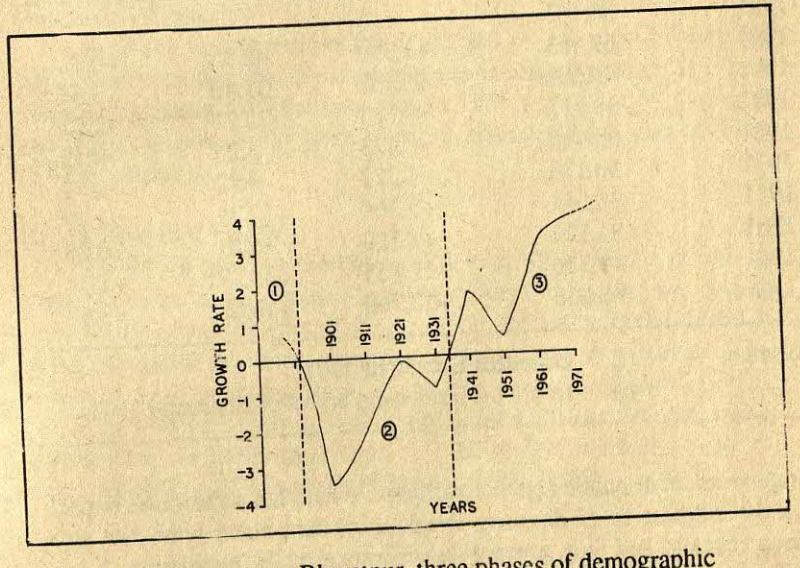


*Fig.* 3-1 Bharatpur, three phases of demographic transition, 1971

In the first fifty years there was a decrease in the population of the city which is unparalled in India. During the 1931-41 decade, population of the city increased by 17.79 per cent and 5.01 per cent again increased in the decade 1941-51. The trend of the population growth during the last two decade 1951-61 (+33.37 per cent) and 1961-71 (+36.68 per cent) have been spectacular. This is due to appreciable

## Table 3-1

**Growth and decade variation of population in Bharatpur city.**

| Year | Population | Actual variation | Decade variation percent | Annual growth rate percent |
|---|---|---|---|---|
| 1881 | 66,163 | - | - | - |
| 1891 | 67,553 | +1,390 | +2.35 | +0.23 |
| 1901 | 43,601 | -13,952 | -35.40 | -3.54 |
| 1911 | 33,918 | -9,683 | -22.21 | -2.22 |
| 1921 | 33,495 | -0,423 | -1.25 | -0.12 |
| 1931 | 30,173 | -3,322 | -9.92 | -0.99 |
| 1941 | 35,541 | +5,368 | +17.79 | +1.77 |
| 1951 | 37,321 | +1,780 | +5.01 | +0.05 |
| 1961 | 49,776 | +12,455 | +33.37 | +3.34 |
| 1971 | 68,036 | +18,260 | +36.68 | +3.67 |

Source: (i) Gazettear Bharatpur 1901.
(ii) District Census hand books of Bharatpur 1971.

improvement in public health conditions. Which has a profound impact on the eradication of diseases. Breaking of Jaisamand bund has also been checked and thus stopped the migration of the population. It has influenced the growth of population. The growth process has also been governed by general economic conditions that have improved due to industrial development. Thus the history of population growth may be divided into four periods:

| | | |
|---|---|---|
| (I) | Period of Slow population growth. | (1881-1891) |
| (II) | The period of deceleration | (1892-1931)<br>Famine, Breaks of Jaisamand Bund of Alwar and Jhiri War retarded the population growth. |

| | | |
|---|---|---|
| (III) | The period of normal growth | (1932-1951) |
| (IV) | The period of population explosion. | (1952-1971)<br>The growth of population due to improvement in health condition, floods and the improvement in economic conditions of the people. |

**Population Explosion**

Looking in the other direction, to the past we can see why the term population explosion has came up into use in recent decades. It seems that the population of Bharatpur city in 1971 was about 68 thousand and will be double in 29 years with the annual growth rate of 1971 (3.67 per cent).

**Growth Trend Since 1931**

The growth trend in the city reveals that till 1931 the growth of population was in the negative side. After 1931, however, we find an accelerated and steady growth of population and naturally the tendency of the population to show a steep rise. It is due to natural increase with excess of birth over deaths. A steady rise boom a growth index of 117.79 in 1941 to 123.69 in 1951 gives an impression of sharply rising tendency and with the great jump in 1961 further reached a peak of more than 200 in 1971 over the 1931 base. (table 3-2)

**Table 3-2**

**Growth trends of the population (Bharatpur city) (1931-1971)**

| Year | Population | Growth Index |
|---|---|---|
| 1931 | 30,173 | 100.00 |
| 1941 | 35,541 | 117.79 |
| 1951 | 37,321 | 123.68 (base year |
| 1961 | 49,776 | 164.96 1931=100) |
| 1971 | 68,036 | 225.48 |

Source: District census hand book of Bharatpur 1971.

### Birth Rate and Death Rates

Birth rate is the number of births in a year per thousand people. Similarly the number of deaths in a year per thousand people is known as death rate. The data of death of birth rates are not available till the last census (1971). For a short study, Municipal board Bharatpur counted the number of deaths and births in the years 1974-78. It further explained in connection with birth rate that 30 per cent cases of the total births did not give their information to the Municipal board. In this way, we can add 30 per cent more in the number of births of the individual year and then find the right birth rate of the city.

**Table 3-3**

**Number of births and deaths in Bharatpur**

| Year | Number of births | Number of deaths |
|---|---|---|
| 1974 | 1850 | 300 |
| 1975 | 1960 | 304 |
| 1976 | 812 | 287 |
| 1977 | 1854 | 269 |
| 1978 | 1913 | 331 |

Source: Municipal Board Bharatpur, March 1979.

Table 3-3 reveals the birth and death rates of the city for a period of five years.

### Population Distribution and Density Scapes

Bharatpur city, with 2,234 hectares of territory, presently has a population approaching 68,036 (1971) and an average density of 30.5 persons per hectare. This is arithmatic density. The density of population can be divided into the following population categories.

(1) *Very high dense population*. In the central part of the city, in ward number 4,5,11,14, and 16 with there is an average density of 420 persons per hactare. The highest density with 587.7 persons per hectare is confined to ward number 16. Moreover, 20 per cent of the total population of the city resides in this part of the city.

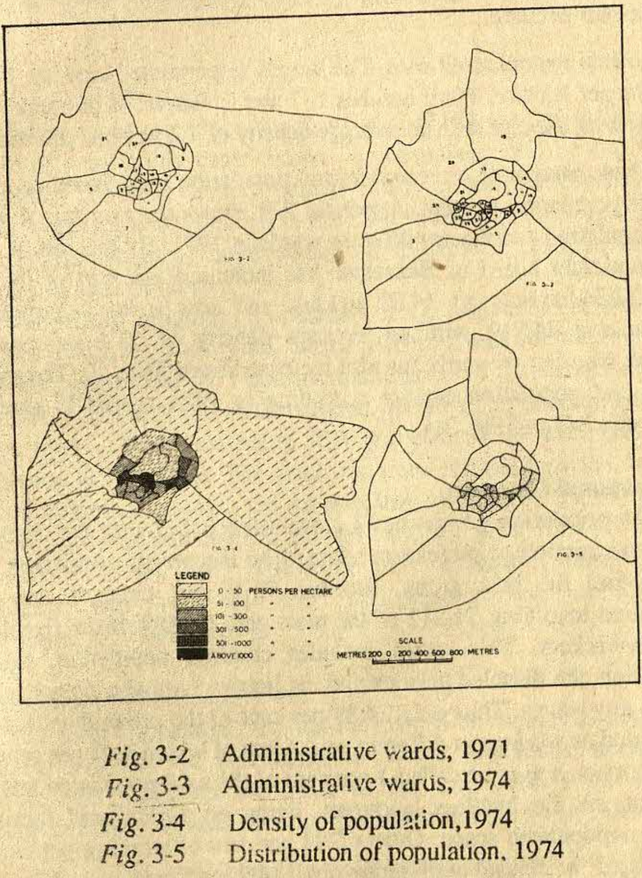


*Fig.* 3-2 Administrative wards, 1971
*Fig.* 3-3 Administrative wards, 1974
*Fig.* 3-4 Density of population, 1974
*Fig.* 3-5 Distribution of population, 1974

(2) *Highly dense population* (101 to 300 persons per hectare). In ward numbers 2, 6, 3, 9, 10, 12, 13, 15, 17, and 18 on an average the density is 221 persons per hectare. In this population category the highest density of 296.6 persons per hectare is found in ward number 13.

(3) *Moderately dense population* (31 to 100 persons per hectare). This population density includes ward number 19 and 20 which mainly cover northern part of the walled city. The total area of this part is 97 hectares with an average density of 59 persons per hectare.

(4) *Thin population*. In this category of population the density ranges from 11 to 30 persons per hectare. Ward number 8 is thinly populated

area. Towards the western side of the city there live a maximum of 28.3 persons per hectare.

(5) *Largely unpopulated area.* The largely unpopulated area has 1 to 10 persons per hectare. Ward number 1, 7 and 21 cover 78 per cent of the total area of the city with an average density of 7.2 persons per hectare.

These categories represent formal population areas based on single trait of population density. Appendix 2-B shows the number of wards and population density in different wards in 1971. By the end of 1974 the Municipal board of Bharatpur has increased the area of the city from 22.34 sq.kms. to 34.83 sq.kms. and now it has a population approaching 74,819 with an average density of 21.2 persons per hectare. Number of wards has also increased from 21 to 30. The area of wards and population density according to 1974 census is given in Appendix 2-C and Fig. 3-4.

## Occupational Structure

The population growth has a close relationship with the character of the occupation or profession adopted by the people. Appendix 2-D shows that the first group, forming 75.10 per cent of the total population involving 21,212 of the male and 29, 889 of the female, is of non-workers. This group includes children population, student population, the disabled persons and the housewives who do not go out to earn any wages. Thus only 24.89 per cent of the urban dwellers and designated as workers in different works, out of which 4.03 per cent are cultivators or it may be called 1 per cent of the total population and 2.2 per cent are the landless labourers, living on agricultural farms in largely unpopulated scape. Others 5.98 per cent of working population is engaged in house hold industries, 14.7 per cent in other than household industries and 4.6 per cent are busy in construction work.

Trade and commerce is the largest group which constitutes 4.9 per cent of the total population or it may be counted 19.9 per cent of the working population. This is due to status of a great commercial mandi and other commercial services. The group of transport work engages 10.9 per cent (1860 persons) and remaining 37.2 per cent of the total workers have been put to other services which include all types of services ranging from domestic servants to the high officials. There are 181 female workers in house hold industries and rest of the groups or workers (occupational groups) have very small number of women-workers.

The comparative data for other cities of Rajasthan (Appendix 2-A) are showing the overall conclusion of urbanisation in the second class towns.

**The Religious Divisions**

Caste is not a mere label but it is a way of life, rigid in the extreme. People of a particular caste forms a community and in this way a community is like a shattered mirror. Each person possesses a piece that is large enough to see his or her own reflection. However, no one has a piece which is large enough to provide a reflection of the community as a whole.[3]

The general religious composition of the population of Bharatpur includes hindu, muslims, jains, sikhs, christians and a few other minor religious groups. The 1971 census enumeration of the municipal board of the city, on which this study is based, shows a preponderant majority of the hindus. They contribute 92.1 per cent of the total residential population of Bharatpur. The other important religious groups, in order of their numerical strength are the muslims constituting 3.2 per cent of the city, sikhs accounting for 2.7 per cent, the jains 1.6 per cent and christians 0.14 per cent. There are only 2 persons following the buddhism and rest of the 36 persons are of different communities.(Appendix 2-E)

**Communal Population Growth**

It is clear (Appendix 2-E) that the growth of communal population tends to increase the percentage in hindus and sikhs, decrease in muslims and christians and static in the jains from 1901 to 1971. Growth trend of different communities since 1901 is given below:

*Hindus*: The total population of hindus declined from 1901 to 1931. This could be explained by the fact that during this period the population of hindus has practically decreased and afterwards continuously increased. The hindu community constituted 69.2 per cent in 1941 and 93.2 per cent of the total population in 1961. This could be possible by not only natural growth but the continuous migration of muslims since 1947 also.

*Muslims*: The number of muslims remained nearly static from 1901 to 1941 afterwards much decreased. This community constituted 31.8 per cent of the total population of landscape in 1921 while 2.3 per cent in 1961. It was due to migration of muslims as mentioned above.

*Sikhs*: Sikh community has consistently increased from census to census. Their proportion to the total population increased from 15 in 1921 to 40 in 1931 and 242 in 1951 to 1663 in 1961. The community is forming 2.7 per cent of the total population and also shows third rank in the communal population structure according to 1971. The sikh community is known the most industrious and hard working class in India. In Bharatpur city most of the sikhs are blacksmiths, riksha drivers, kulis and labourers.

*Jains*: Jains have remained proportionately constant to the total population for the decades. The total strength of the jains was 722 in 1901 which shows the 1.7 per cent of the total population and the same proportion confined in 1971 while the number of jains became 1142.

*Christian:* This is a very small community and the total number of christian was 369 in 1931 which decreased by 13 in 1951. By the end 1971 the total strength became 94 which was 0.13 per cent of the total population of the landscape.

*Other:* There were 131 persons belonging to the other communities in 1901 and reduced in 1971, confined to 36 persons only.

**Communal Population Concentration**

The areal spread of the various communities in Bharatpur has not been uniform over all parts of the city. The Author surveyed the city and found that other communities like muslim, jain, sikh and buddhist concentrated over some scapes and christian community is scatterly distributed over the landscape. Population concentration of minor communities in the different areas is given below:

*Muslim*: Muslim community is mainly concentrated in Machhli mohhlla (900 persons) and Gopal garh (675 persons). Other places are Buddha ki haat (330 persons), Kasaiyon ka mohhlla (220 persons), Annah gate (60 persons) and Idgaha outside the Kumher gate (50).

*Sikh*: Concentration of sikh community confined in Namak ka katla (650 persons), in front of the General hospital (600 persons), Buddha ki haat (300), Atal bund gate (200) and outer Mathura gate has 200 persons. Rest of the 70 persons are residing in different places.

*Jain*: Ninety per cent of jains are living within a circle, if it is drawn from Kotwali with the diametre of 200 metres. Another 10 per cent scatterly distributed over the landscape.

*Christian*: This community has no specific concentration but scatterly distributed over the landscape. There were only 25 families (97 persons) in 1974. Distribution of christian families at the different places is given below:

One family at Gowardhan gate, Two families near Picture palace, two families at railway station, three families at Neemda gate, six families at the Hospital road, five families in Nawab Sahib ki gali, one family at Gopal garh, three families near St. Peter school and two families in Pahi bagh.

Now, to identify the variation in the distribution of the religious group to the individual ward, we have a statistical indicator that is being termed "the concentration ratio" or "R"

$$R= \frac{TwG}{TbG} \times S5$$

Where; $TwG =$ Total ward population belonging to a group.

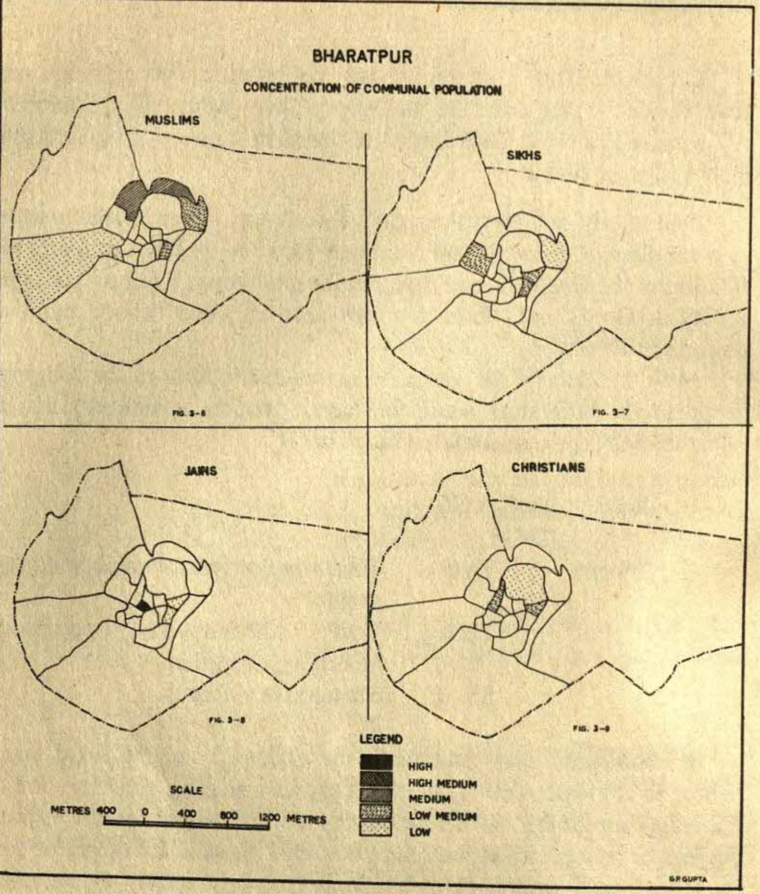
$TbG =$ Total Bharatpur's population belonging to a group

$S5 =$ Standard deviation 5.

R, computed thus naturalises the effect of varying ward sizes. Where R is greater than 1, the ward shows a relative concentration of the religious group. To determine the cut off points for the various degrees of concentration, we have computed the standard deviation 5 of the R's of each group. Wards having R below the mean (-R) indicates low or negative concentration; the group (+1) indicates low-medium concentration, (+ 2S) indicates medium; (+ 3S) indicates high medium and (+ 4S) and above shows high concentration. (Fig. 3-6, 3-7, 3-8 and 3-9)

### Population and Sex Composition

Sex ratio gives in realistic term a comparison between the number of males and females in the population. Further, sex ratio is a significant demographic and cultural index and an important aspect for the population geographers in a discussion of regional characteristics. It can reflect the biological, social, economic and migrational characteristics of a population. Social, economic and community life are affected in many ways by large imbalances in sex composition.



Almost in all the Indian cities there is preponderance of males in the population. Bharatpur is no exception, which can be seen from the table 3-4. The sex ratio, in Bharatpur city is 829 females per 1,000 males according to 1971. In 1901 the proportion of the sex composition was 54.8 per cent for males and 45.2 per cent for females. The male population has constituted the majority varying between 54.3 per cent and 57.6 per cent while female population between 42.4 per cent and 45.8 per cent. Thus we see that the proportion of female population decreased due to male's immigration to the city as workers mainly in industrial sector and other various occupations. Minimum 738 females per 1,000 males was in 1921 and the maximum females 829 per 1,000 males confined in 1901.

## Table 3-4
## Number and percentage of males and females to total population (1901-1971)

| Year | Males, number & percentage of the | Females, number & percentage of the | Females per 1000 males in Bharatpur city | Females per 1000 males in urban Bharatpur District. | Females per 1000 males in urban Rajasthan |
|---|---|---|---|---|---|
| 1901 | 23703<br>(54.8%) | 19,898<br>(45.2%) | 839 | 895 | 947 |
| 1911 | 18,803<br>(54.6%) | 15,115<br>(45.4%) | 803 | 855 | 936 |
| 1921 | 19,268<br>(57.6%) | 14,227<br>(42.4%) | 738 | 830 | 897 |
| 1931 | 16,736<br>(55.2%) | 13,437<br>(44.8%) | 802 | 861 | 903 |
| 1941 | 19,486<br>(54.3%) | 16,055<br>(45.8%) | 823 | 857 | 897 |
| 1951 | 21,228<br>(56.7%) | 16,093<br>(43.3%) | 758 | 850 | 928 |
| 1961 | 27,805<br>(56.2%) | 21,971<br>(43.8%) | 790 | 826 | 882 |
| 1971 | 37,183<br>(55.2%) | 30,853<br>(44.8%) | 829 | 837 | 875 |

Source: District Census Hand Book Bharatpur. 1971.

**Population Structure**

Age being one of the fundamental characteristics of man knowledge of its distribution is basic in all population analysis. Different age groups assume social and economic importance in any society while planning different types of programmes. Table 3-5 shows the age structure of population of Bharatpur city in 1971.

The age structure of a population is represented by the age-sex pyramid, a very useful graphic device from depicting such national age characteristics.[4] In a population having a rather rapid rate of growth, the age structure is rather like a pyramid. It depicts the situation that 42.60 per cent of Bharatpur's population is under fifteen years old, 5.20 per cent above 60 years old and rest of the 52.20 per cent in between 15 and 60 years of age. (Fig. 3-10) The last group, having 52.20 per cent population is confined to working class of the city.

**Table 3-5**

**Age structure of population (Bharatpur city -1971)**

| Years | Males | Females | Total |
|---|---|---|---|
| 0-14 | 15,658 | 13,331 | 28,989 |
| 15-19 | 4,187 | 3,094 | 7,281 |
| 20-24 | 3,432 | 2,754 | 6,186 |
| 25-29 | 2,403 | 2,301 | 4,704 |
| 30-39 | 4,262 | 3,692 | 7,954 |
| 40-49 | 3,180 | 2,516 | 5,696 |
| 50-59 | 2,127 | 1,520 | 3,647 |
| 60- | 1,932 | 1,639 | 3,571 |

Source: District Census Hand book Bharatpur, 1971.

The population pyramid provides efficient statistical summaries of the condition of a given population. Further more, population pyramid can also be used to interpret relationship among different groups of people. Population of an area includes one or more minorities. While majority populaition shows the beehive structure, the minority may very well be represented by the regularly shaped, trianguler pyramid reflective of higher birth and death rates and pyramid with bowed sides like that of Bharatpur city which depicts high birth rates and declined death rate. This shows that minority population is growing more rapidly; its economic situation is likely to be quite different from that of the majority.[5]

**The Rate of Literacy**

A wide diffusion of education is an essential part of the modern civilisation and high literacy rate is one of the most important indices of highly developed economy. Literacy rate is one of the important demographic element which is a good measure of human progress towards modernisation.

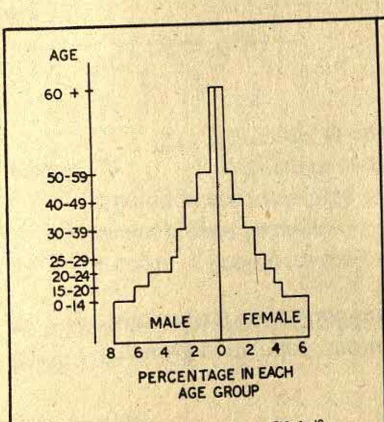


FIG. 3-10

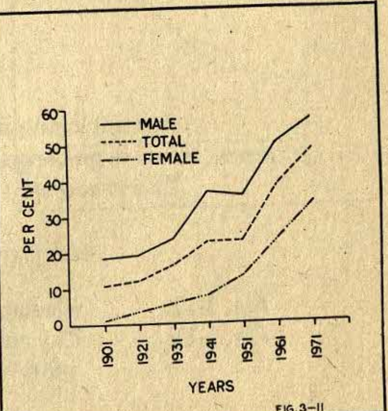


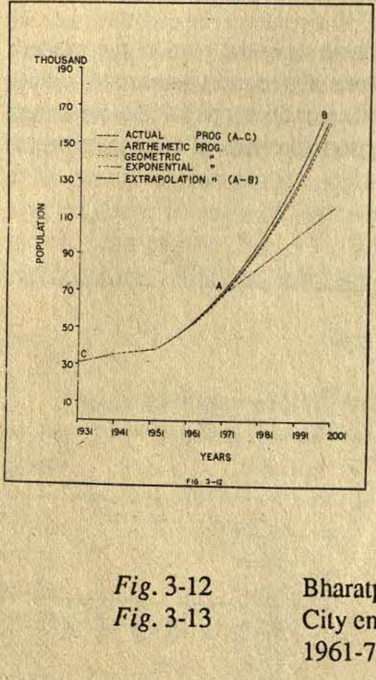
FIG. 3-11

*Fig.* 3-10 Bharatpur, age structure, 1971

*Fig.* 3-11 Bharatpur, literacy rate, 1971

1971 census reveals that out of the total population of 68,036, there were 32,617 literate persons in Bharatpur city: 21,685 were males and 10,932 were females. The literacy rate for Bharatpur city works out to be 47.90 per cent as a whole, 56.70 per cent for the male population and 33.30 per cent for the female population.

Appendix 2-F shows that the literacy rate of Bharatpur city increased from 10.20 per cent (1901) to 47.90 per cent (1971). In fact literacy is increasing from decade to decade not only in the male population but in female population also. In 1901 only 0.90 per cent females were literate while 33.30 per cent reached till the end on 1971 which is higher than the average female literacy (29.69) of Rajasthan urban. (Fig. 3-11)



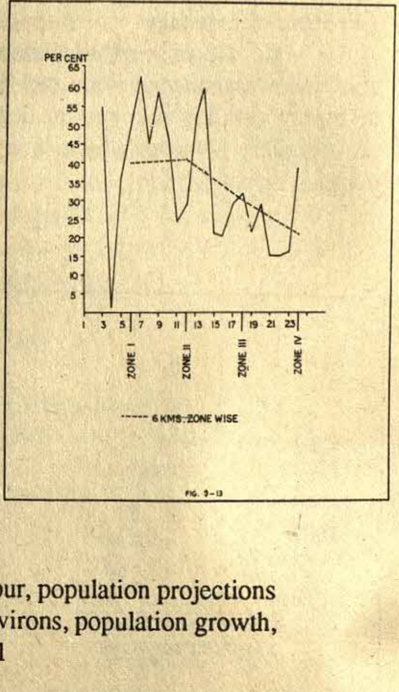


*Fig*. 3-12 Bharatpur, population projections
*Fig*. 3-13 City environs, population growth, 1961-71

## Demographic Projections

Demographic projection have in common the desire to convey a plausible picture of future population growth. In contrast, projections which relate to dates following the last census, usually future dates, for which no current reports are available. Demographic projections, then, are essentially concerned with future growth. They may be prepared for the total population of a nation, their principal geographic subdivisions or specific localities within them.

Any attempt to make demographic projection is fraught with uncertainties and there is no fixed law of population increment. Various techniques of projections are apt to give widely varying results.[6] Population of Bharatpur from 1981 to 2001 has been projected on the basis of arithmatic, geometric, exponential and extra-polation techniques. The projected population of Bharatpur city is given in table 3-6.

Arithmetic progression is based on the basis of natural growth of population per year. While the geometric progression is calculated with the help of a formula.

$$Y = a\, r^{n-1}$$

where $Y =$ the year chosen
$a =$ the first year
$r =$ the common factor
and $n =$ the interval of years.

$$\frac{P2}{P1} = e^{rn}$$

According to exponential method:

where; P2- Population corresponding to current census.
P1- Population corresponding to base year census.
r- rate of annual growth.
n- number of years between two census.

According to exponential method;
(Base year 1951)

For example:

$$\frac{68036}{37321} = e^{r.20}$$

or $1.8229 = e^{20.r}$
or $\text{Log } 1.82299 = 20\, r \text{ Log } e$
or $0.26078 = 20\, r \times 0.43429$
or $r = 0.030024$

Now:

$$P_{81} = 68036 \times e^{10} \times 0.030024$$
$$\text{Log } P_{81} = \text{Log } 68036 + 0.30024 \times \text{Log } e$$
$$\text{Log } P_{81} = 4.83273 + 0.30024 \times 0.43429$$

## Table 3-6

## Population projection for Bharatpur city

| Year | Actual population | Arithmetic progression | Geometric progression | Exponential progression | Extra polation |
|---|---|---|---|---|---|
| 1931 | 30,173 | - | - | - | - |
| 1941 | 35,541 | - | - | - | - |
| 1951 | 37,321 | - | - | - | - |
| 1961 | 49,776 | - | - | - | - |
| 1971 | 68,036 | - | - | - | - |
| 1981 | - | 83,393 | 91,848 | 91,862 | 92,101 |
| 1991 | - | 98,750 | 1,23,995 | 1,24,030 | 1,30,000 |
| 2001 | - | 1,14,109 | 1,67,394 | 1,67,463 | 1,75,000 |

Source: Calculated on the basis of 1951 and 1971 census of India Population Data.

$$\text{Log } P_{81} = 4.963132$$
$$P_{81} = 91862.2$$

In this way, $P_{91}$ and $P_{2001}$ can be calculated.

While applying extrapolation method, it will be desirable to consider only for next one decade and afterwards the curve extrapolated with the same trend to get the projection of population for the years of 1991 and 2001. (Fig. 3-12)

**Population Policies and Planning**

Poverty problem has been recognised as a major challenge of the country today. This problem is the central focus of attention in all the developmental programmes and activities. It is in this context the whole question of population policy and family planning must be looked upon for the future prosperities of the area.[7]

The high rate of population growth in India or any where is difinitely acting as a negative factor in her economic growth. The realization is spreading that the explosive population growth of Bharatpur city with its attendent rise in demand for more foodstuffs and employment will keep the cultural landscape in a state of perpetual crisis, environmental and otherwise.

An extension of family planning must be a first step towards population control. Additional programmes beyond family planning will unquestionably be required in order to halt the population explosion. The important distinction between family planning and population control must be recognized and given emphasis in all birth control programmes.

Demographic structure of a region is intimately related to its physical, economic, social and cultural environment. The demographers task is to explain the diversity of this ever changing demographic structure its causes and effects vary in time and space.[8] Here the relationship between the distant zones and the demographic structure of the settlement patterns has been analysed. This attempt is based on the hypothesis that the demographic variables specially, the population density, population growth, sex ratio, dependency ratio, literacy rate, scheduled caste and scheduled tribes in the city environs has an impact on the socio-economic activities of the city.

**Demographic Landscape of Bharatpur City Environs:**

Here we only concentrate upon the net decrease or increase of the population during the decade 1961-71 when the mean population growth of the city environs was 28.70 per cent while it was 25 per cent for the country as a whole.

Table 3-7 depicts that mean population growth varies from 2.29 per cent in the 3 to 4 km. circle to 63.09 per cent in the 6 to 7 km. When analysis is done at six km. intervals, it is found that the second zone from the centre has a maximum growth percentage of 41.16 and the fourth zone a minimum of 21.48 per cent. Taking zones at one km. of sudden decline comes beyond 3 km. It is a flood prone area of the city environs for centuries. It indicates the Ghana area to the south-east and Motijhil to the north-east of the city. The figure 3-13 also indicates a fluctuating trend in the growth of population upto the periphery. It also shows that the growth rate falls down beyond the 12 kms. circle indicating the limit of city influence.

In the first zone, the population growth has a low correlation with variables. (Appendix 2-G to 2-K)** The values of correlation vary from 0.827 with dependency ratio to -0.919* with infrastructure facility. The positive correlation with dependency ratio indicates that most of the workers have shifted to the city to work in the industrial sector. In the second zone, the correlation values vary from 0.770 with literacy rate to -0.794 with primary workers.

In the third zone, the population growth shows very low correlation with other variables. The correlation values vary from 0.468 with scheduled caste population to -0.882** with dependency ratio. Such relationship shows that working class population has migrated towards the city. The fourth zone shows a very low correlation between the population growth and the other variables. The values of which vary from 0.258 with residential houses to 0.707 with scheduled tribes. This is due to the fact that the area of Mathura and Kiraoli tehsils do not have even a single scheduled tribe.

The region as a whole shows that there exists a weak correlation between population growth and the other variables, the values vary from 0.508 with scheduled tribes to 0.830 with infrastructural facilities. Thus the growth of infrastructural facilities is not according to the population growth.

In brief, there exists a high population growth upto a distance of 12 kms. from the city. This reveals that people come daily to the city to work either in the industrial or commercial sector.

### Density of Population

The mean density of population in the Bharatpur region is 236 persons per sq.km. This is low as compared to the 266 persons per sq.km. of the nation. If we consider km. to km. density there exists a maximum density of 588 in the zone between 2 and 3 km. and minimum density of 136 in the 6 to 7 km zone. While analysis is made on the basis of six -kms. -zone, the density values vary from 270 to 206 person per sq.km. in zone I and IV respectively. All zones, except the first one show that there exists a density of less than national average. (Table 3-7) Figure 3-14 shows that there exists a high density of population upto a distance of 6 kms. beyond which the population density goes on falling upto 12 kms. after which it again rises. It proves that the city's influence is confined to 6 kms only.

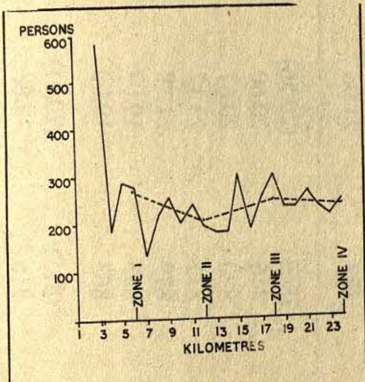


FIG. 3-14

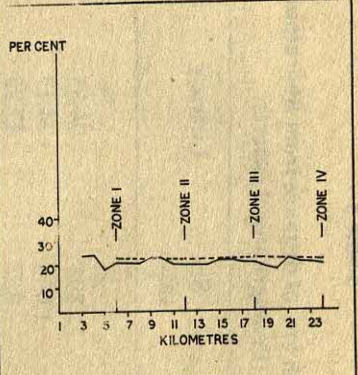


FIG. 3-18

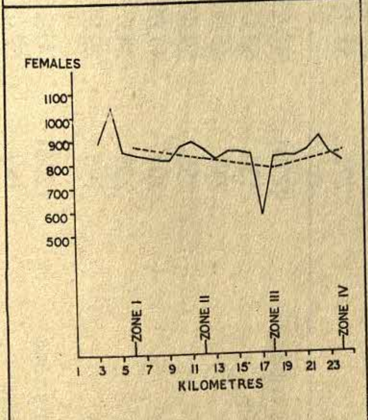


FIG. 3-16

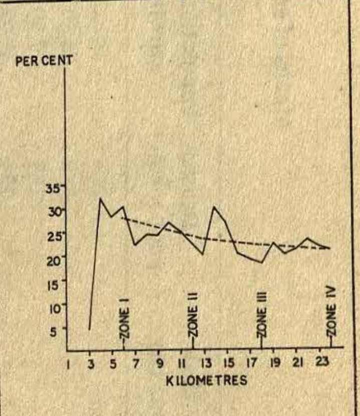


FIG. 3-20

FIG.3-14 City environs, zonewise density of population, 1971

*Fig.* 3-16 City environs, zonewise sex ratio, 1971

*Fig.* 3-20 City environs, zonewise scheduled caste.

*Fig.* 3-18 City environs, zonewise literacy, 1971

## Table 3-7

### Means of each km. of distance from Bharatpur city
### (Demographical aspects)

| Distance from Bharatpur city | Density per sq. km. | Population growth | Sex ratio | Literacy | Scheduled caste | Scheduled tribes | Dependency ratio |
|---|---|---|---|---|---|---|---|
| 1 to 2 Km. | --- | --- | --- | --- | --- | --- | --- |
| 2 to 3 " | 588 | 54.59 | 891 | 24.35 | 4.35 | 13.88 | 3.48 |
| 3 to 4" | 187 | 2.29 | 1,047 | 24.17 | 32.01 | 0.53 | 2.27 |
| 4 to 5" | 281 | 35.28 | 857 | 17.95 | 28.33 | 1.26 | 2.76 |
| 5 to 6" | 271 | 51.35 | 837 | 21.08 | 30.61 | 1.96 | 4.43 |
| Ist 6kms zone | (270) | (40.23) | (863) | (20.56) | (28.91) | (2.11) | (2.83) |
| 6 to 7km | 136 | 63.09 | 846 | 20.60 | 22.44 | 6.70 | 2.71 |
| 7 to 8" | 212 | 45.20 | 820 | 20.67 | 24.09 | 1.73 | 2.66 |
| 8 to 9" | 258 | 59.45 | 811 | 23.17 | 24.09 | 0.30 | 2.92 |
| 9 to 10" | 201 | 47.09 | 879 | 21.78 | 27.96 | 2.66 | 2.75 |
| 10 to 11" | 239 | 24.67 | 893 | 19.07 | 25.60 | 0.26 | 2.39 |
| 11 to 12" | 195 | 29.99 | 863 | 19.00 | 20.78 | 0.82 | 2.62 |
| IInd 6kms zone | (206) | (41.16) | (815) | (20.61) | (24.33) | (1.71) | (2.65) |
| 12 to 13km | 189 | 52.02 | 816 | 19.88 | 21.65 | 1.75 | 2.68 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 to 14" | 180 | 60.07 | 858 | 19.09 | 31.67 | 0.92 | 2.57 |
| 14 to 15" | 313 | 21.14 | 849 | 22.91 | 27.53 | 0.28 | 2.79 |
| 15 to 16" | 191 | 20.21 | 839 | 22.04 | 20.89 | 1.37 | 2.73 |
| 16 to 17" | 245 | 28.66 | 577 | 21.38 | 19.12 | 0.91 | 2.71 |
| 17 to 18" | 303 | 33.50 | 829 | 20.81 | 18.91 | 0.48 | 2.75 |
| IIIrd 6kms zone | (248) | (30.58) | (780) | (21.41) | (22.17) | (0.80) | (2.73) |
| 18 to 19km | 232 | 22.13 | 835 | 18.89 | 22.10 | 1.76 | 2.78 |
| 19 to 20" | 232 | 28.44 | 830 | 17.55 | 20.25 | 1.49 | 2.60 |
| 20 to 21" | 259 | 15.21 | 849 | 23.57 | 21.47 | 0.97 | 2.62 |
| 21 to 22" | 237 | 15.66 | 909 | 21.42 | 23.93 | 1.80 | 2.60 |
| 22 to 23" | 215 | 16.49 | 844 | 20.92 | 22.28 | 1.70 | 2.76 |
| 23 to 24" | 239 | 38.34 | 824 | 19.84 | 21.87 | 0.70 | 2.55 |
| IVth 6kms zone | (237) | (21.48) | (847) | (20.77) | (21.94) | (1.23) | (2.64) |
| whole environs | (236) | (32.07) | (818) | (20.95) | (23.07) | (1.22) | (2.68) |

In zone first there exists a highly significant correlation between residential houses, tertiary workers, literacy and scheduled tribes. (Appendix 2-G to 2-K). The values of correlation vary from 0.996* with residential houses to -0.987** with scheduled caste population. The reason of the high positive correlation with the above stated variables is the existence of the Bharatpur city, which is service-cum-industrial city. In zone second, there is a low correlation between density and other variables except residential houses, the values of which vary from 0.974* with residential to 0.907** with scheduled tribes. Zone third shows a highly significant correlation between density with total workers, secondary workers, tertiary workers. social amenities and residential house. The correlation values vary from 0.990* with residential houses to -0.949* with primary workers. In the

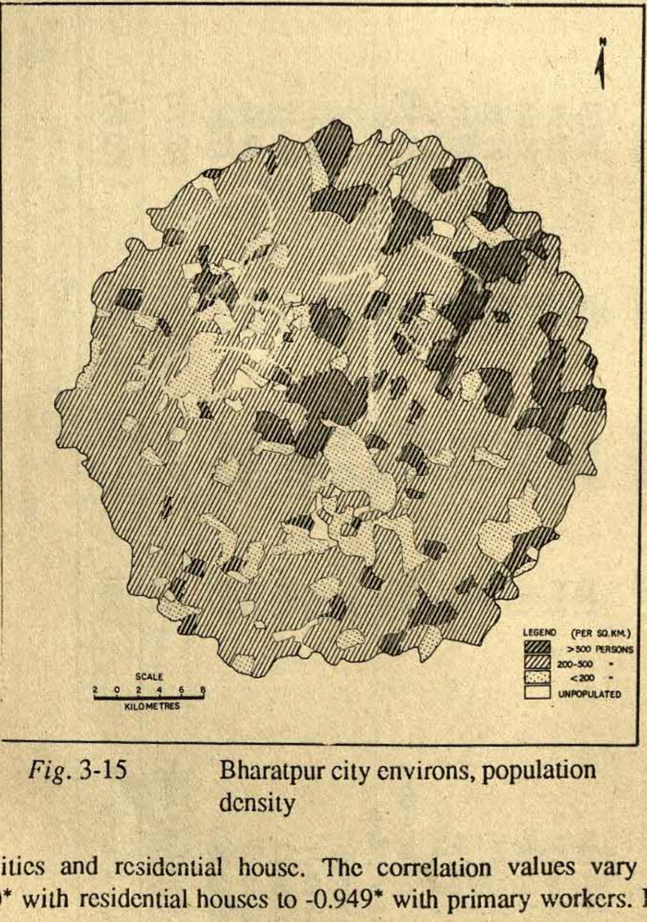


*Fig.* 3-15 Bharatpur city environs, population density fourth zone, the correlation values vary from 0.921 *with education facility to -0.455 with scheduled tribes. The negative correlation with scheduled tribes is in the zone, because of eastern side there are no scheduled tribes.

In the region as a whole, the correlation values vary from 0.998* with residential houses to -0.768 with primary workers. All the zones show a highly significant correlation with residential houses.

Figure 3-15 depicts that there exists three categories of the density of population in the environs, i.e. the low category of less than 200 persons per sq.km, the high category of 200 to 500 persons per sq.km and the very high category of more than 500 persons per sq.km.

In zone one, five scattered patches including six settlements reference are showing very high density of population. And rest of the area of the zone falls under high density of population. In zone second there are two small patches of very high density, one in the north near Abar and the other in the east near Pipla. Some other patches belong to very high density and scatterly distributed in the eastern side. Most of the area shows high population density . There exists a low category of density in the southern part mainly in the small size villages. In zone third there are 16 patches scattered throughout the environs belong to high population density. The settlement in the north-east side (Mathura and Kiraoli tehsil) falls in high category of population density. Though south western part of the zone also shows a high density but some unpopulated and the patches of low population density are lying in between.

The entire fourth zone experiencing a high population density except the north-eastern part where the very high category of population density is observed in some patches.

Thus figure 3-15 depicts that the very high density is compact arround the city. The low population density in the second zone is due to a vast flood prone area and 15.2 per cent (Total of the zone), unpopulated settlements. Again the rise in the density population is in zone third. The hypothesis is, therefore, justified that there is an inverse relationship between the distance and the density of population. Thus the analysis reveals that the Bharatpur city shows its influence upto a radius of 6 kms. only.

## Sex Composition

The sex composition of a population is one of the aspects for showing the demographic and socio-economic implications. The socio-

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economic implications reveal that the two sexes differ considerably with respect to their participation in skilful work. The sex composition is uneven near the city than away from it. It is because the male adults migrate from the rural areas to the city for their employment. They work in the city and their places of residence are the suburban parts of the city. They increase not only the growth and density of the population in the villages near the city but also effect the sex-ratio. On the whole there are 818 females per thousand male population, it is very low when compared of 911 for the Rajasthan as a whole and 930 for the country as a whole. Table 3-7 depicts that the mean sex ratio varies from 1047 in the 3 to 4 km circle to 537 in the 6 to 7 km. area.

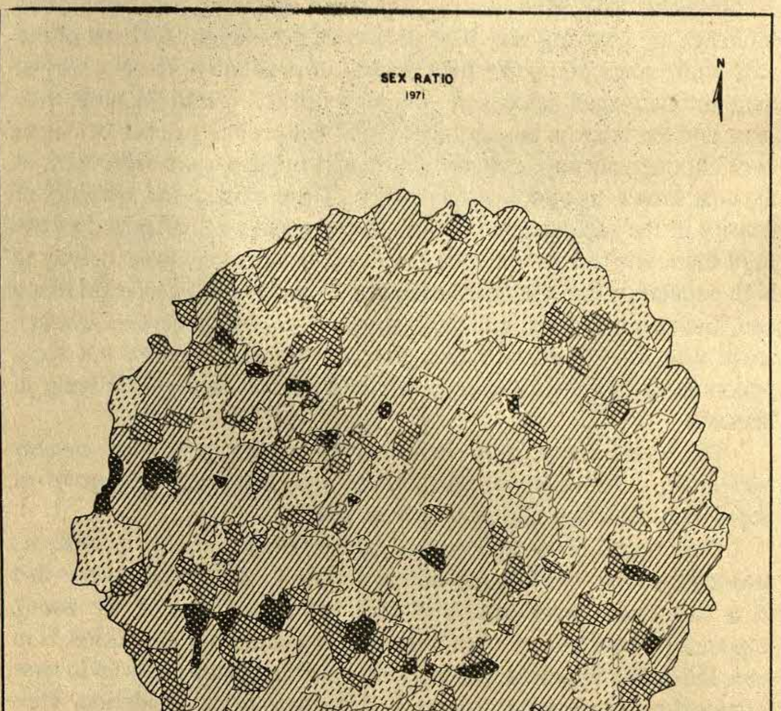


*Fig.* 3-17 Bharatpur city environs. sex ratio

When we analyse the six kms. zones. We find that the first zone has a maximum sex ratio of 863 and the third, a minimum sex ration of 780. Figure 3-16 shows the highest sex ratio at 3 to 4 km. circle where the prostitutes ae living at Jatoli Ghana and a sudden decrease comes at the next 4 to 5 km. area. And the further, except a sudden fall at 16 to 17 km. area the sex ratio follows the fluctuation trend upto the periphery.

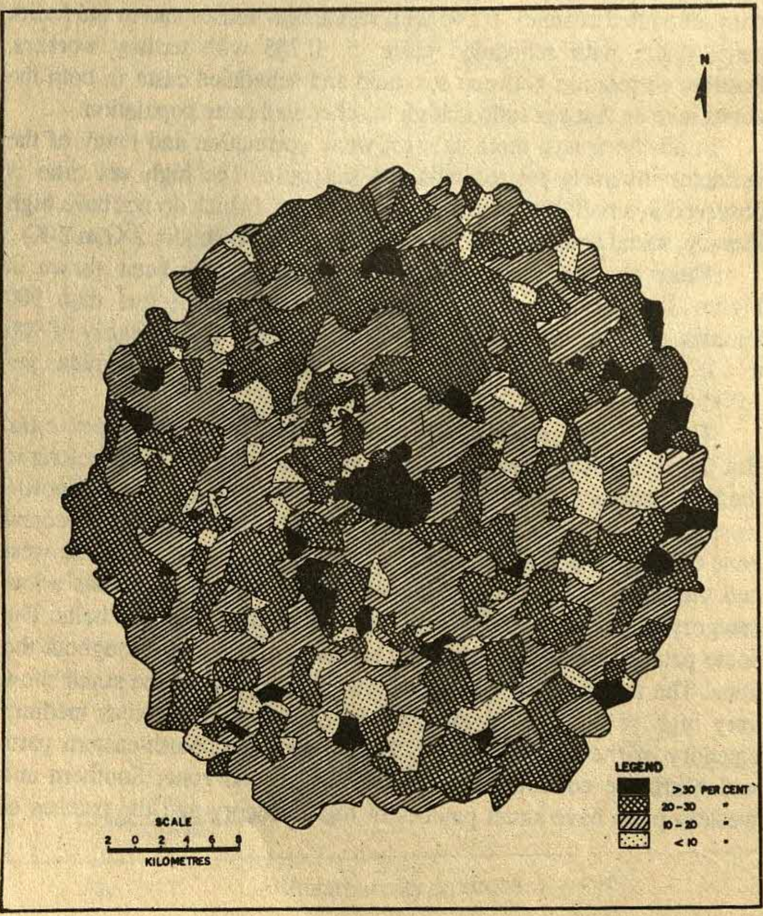
In zone one there is low correlation between sex ratio and some other variables. The values of the correlation vary from 0.939 with education facility to -0.884 with population growth. A high correlation with education facility reveals that the females education is on the increase. Second zone shows the low correlation between sex ratio and other variables. The values of which vary from 0.752 with population density to -0.928 with tertiary workers at 1 percent level of significance. In the third zone, the correlation values vary from 0.495 with scheduled caste to -0.540 with residential houses and in the fourth zone, 0.805 with scheduled caste to -0.708 with tertiary workers. Positive correlation between sex ratio and scheduled caste in both the zones reveals that sex ratio is high in scheduled caste population.

In all the zones, there exists a weak correlation and many of the variables inversely related with the sex ratio. The high sex ratio is observed in small settlements at the rural areas which do not have high literacy, social amenities and tertiary activites. (Appendix 2-G to 2-K)

There are four categories of sex ratios as have been shown in Figure 3-17. These categories are: low category of less than 900 females, the Medium category of 800 to 900, the high category of 900 to 1,000, and over-sex-ratio category of more than 1,000 females per 1,000 males.

The first zone mainly falls under medium category of sex ratio. But the two patches, one in the east and second in the west, belong to the high category. And the other two small patches, one towards north-west and second in south-east reveal the over sex ratio. In the second zone there exist two large patches of medium category one in the west and the other in the north.In between two patches there exists a low category of sex ratio in the form of small patches and short belts. The some patches show high sex ratio scatterly distributed throughout the zone. The two patches in the north and four patches in the south show very high sex ratio. The third zone shows that there exists medium category of the sex ratio in the south-eastern and north-eastern parts which are the continuous patches of the second zone. Southern and western parts have small patches of high category and the patches of over sex ratio are observed scattering way over an area. Mainly a low sex ratio is observed in small patches in the zone. The northern and southern parts of the fourth zone show medium category of sex ratio. These are the extended of third zone. Low and high categories of sex ratio are observed throughout the zone. Three small patches in the north-west and three in the south-east enjoy with over sex ratio.

Nearly 4.6 per cent of the total settlements of the environs show over sex ratio. This is because the male population of these settlements has permanantly shifted to the city to work in industries. It is concluded that the low sex ratio is observed near the city. However as the distance from the city increases, less and less migration takes place. Bharatpur city shows it influence upto a radious of 13 kms. only.



**Literacy Rate:**

In the environs of the city the literacy rate is 20.95 per cent. This is very low as compared to the all India literacy rate of 29.45 per cent. (Table 3-7) Analysing this on one km. interval, the values of literacy rate vary from 17.55 per cent in the circle of 19 to 20 km. and 24.33 per cent in 2 to 3 km. circle. This is because of high level of educational facilities available in the city in comparision to distant places. On the basis of six km. zone the result indicates that zone third has maximum literacy rate of 21.41 and zone one has a minimum literacy rate of 20.56.

In figure 3-18, the curve shows a declining trend upto a distance of 5 kms. followed by an increasing trend to the next one km. and beyond that a steady trend upto 8 kms. After that there is a fluctuating trend upto priphery but a rapid increasing trend confined at 21 km. radius which is due to the presence of Fatehpur Sikri town. The correlation matrix (Appendix 2-G to 2-K) show that there exists a medium correlation between the literacy and other variables, as population growth, scheduled tribes, tertiary workers and residential houses. The values of correlation vary from 0.684 with scheduled tribes to -0.685 primary workers. In zone second the correlation values vary from 0.890** with dependency ratio to -0.788 with primary workers. Such relationship shows that the non working class population is more literate. In zone third there exists a high correlation between the literacy and the other variables, the values of which vary from 0.880** with dependency ratio to -0.560 with primary workers. It shows the same correlation as in the second zone. Zone fourth also shows a high correlation of literacy among the other variables, the values of which vary from 0.816** with total workers to -0.605 with population growth.

The city environs as a whole shows a low correlation between the literacy and with other variables. The correlation values vary from 0.563 with total workers to -0.894 with Scheduled tribes. The low correlation with total workers shows that a large working class population is illiterate.

Figure 3-19 depicts that there are four categories of the literacy rate, i.e., the very low category of less than 10 per cent, low category 10 to 20 per cent, high category 21 to 30 per cent very high category of more than 30 per cent.

The first zone shows that there exists a high category of literacy towards the western and eastern parts in the form of small patches and two big patches, one in the north-east and second in south-east belong to low category. A very small patch towards the north shows very high category of literacy. Zone second mainly falls in both low and high categories of literacy which exist throughout the zone in the form of small patches and rest of the area of the zone falls either in very low or very high category also in the small patches. In third zone, the High category of literacy is observed in the north-eastern part in the form of a belt and also in the south, west and northern parts in the form of small patches. A very high category of literacy in the form of small patches is observed scattered throughout the zone. Some small patches, scatterly distributed over an area show low category of literacy, because of the lack of transport net-work and social amenities. In zone fourth, there exists a high category of literacy towards south, south-west, and north-west. The very high category exists mostly towards the north-east, a small patch towards south-western in the Fatehpur Sikeri Town and other small patches in the rest of the area.

Figure 3-19 depicts that there exists a very high literacy rate in the central part. It exists in the large settlements and in the town. The high category of literacy rate is observed towards the northern part along the transport net work. Thus the development is taking place in large size settlements and towns where a large number of literate people are available. Thus there exists an inverse relationship between the distance and the literacy rate. The overall analysis reveals that Bharatpur city shows its influence upto a radius of 4 km. only.

**Scheduled Caste**

The mean scheduled caste population of Bharatpur is 23.07 per cent, which is higher than the averave of 14.60 per cent of or the country as a whole and 16 per cent for the state (Rajasthan). Most of the scheduled caste population lives in the rural settlements.

The scheduled caste population varies from 4.34 per cent to 32.01 per cent in the zone of 2 to 3 km. and 3 to 4 km. respectively. On the basis of 6 km. zone, the result indicates that zone one has maximum proportion of scheduled caste population of 28.91 per cent and the zone four has minimum proportion of 21.94 per cent.

Figure 3-20 shows that the scheduled caste population decreases with an increase in the distance from Bharatpur city except the area of 2 to 3 km. which shows 4.34 per cent only. Because of the scheduled tribes and the other casts population reside here. The highest point is observed at the 3 to 4 km. circle and decreases in the next 4 to 5 km.

area. The area of 5 to 6 km. shows an increasing trend which is followed by a fluctuating trend upto periphery.

The correlation matrix (Appendix 2-G to 2-K) depicts that in zone one, there is a high correlation between scheduled caste and total workers, primary workers, secondary workers and the infrastructure facilities. The correlation values vary from 0.920 with primary workers to -0.997 with residential houses. This shows that most of the scheduled caste population is engaged in primary activity. In zone second, the correlation between scheduled caste and other variables is very low. The correlation values vary from 0.564 with infrastructure to -0.365 with secondary workers. In zone third, there exists a very low

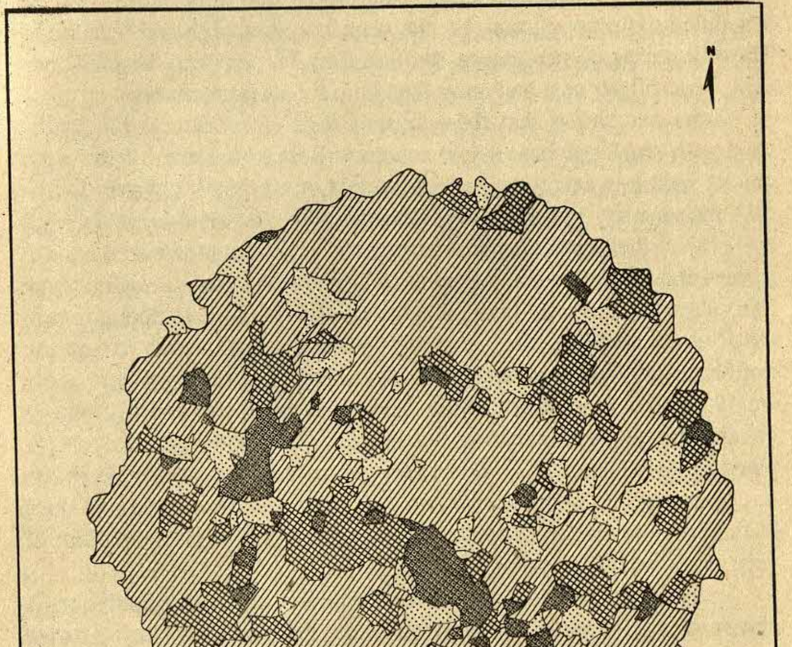


*Fig.* 3-21 Bharatpur city environs, scheduled caste, 1971 correlation between scheduled caste with other variables. The correlation values vary from 0.495 with sex ratio to - 0.515 with dependency ratio. In the fourth zone, the correlation values vary from 0.901 with primary workers at 1 per cent level of significance to - 0.918 with tertiary workers at 5 per cent level of significance. This relationship shows that most of the scheduled caste population is engaged in primary activity.

In the region as a whole, the values of correlation vary from 0.942 with primary workers to -0.968 with tertiary workers. Thus the scheduled caste population shows a positive relationship with primary workers and negative with tertiary workers.

Figure 3-21 clearly depicts that there are four categories of scheduled caste population, i.e. the very low, low, high and very high. These in terms of percentage are less than 10 per cent, 10 to 30 per cent, 31 to 50 per cent and more than 50 per cent respectively.

Zone one shows that there exists a high category towards south-west with small patches of low category. Rest of the area of the zone enjoys with low category. In zone second, a big patch towards south-east shows very high category. One patch to the south-west, of high category is the extended part of first zone. The remaining area mainly toward the north east of the zone falls under the low category. Zone third shows that a very high category of scheduled caste population in the form of small patches is observed thoughout the zone except the northern part. The low category is seen entirely in the north and some small patches toward the other sides. Likewise the fourth zone is covered by the low category, but more towards the northern part. A patch of high category is also observed towards the north. There are three patches one in the north-west, second in the south-west and third in the east showing very low category is also observed in the form of very small patches throughout the zone.

In brief, the highest proportion of scheduled cast population is observed in the primary activities and decreases as the distance increases from the city. The city's influence is upto the distance of 18 kms. only.

## Scheduled Tribes Population

The mean percentage of scheduled tribes population of the city environs is 1.22 per cent. This is very low as compared to the mean scheduled tribes population of the nation which shows 6.94 per cent. The percentage of scheduled tribes population in the urban centres is very low only 0.2 per cent in Bharatpur city and nil in Fatehpur Sikri town. Most of them reside in rural settlements. The proportion of the scheduled tribes population vary from 0.07 per cent to 13.88 per cent in the circle of 23 to 24 km. and 2 to 3 km. respectively. Analysis based on the six kms. zone reveals that the proportion of scheduled tribes population varies from 0.80 per cent in zone third to 2.11 per cent in zone one. Table 3-7 shows that there exists a negative relationship between the distance and scheduled tribes population. The highest population of scheduled tribes is observed at the circle of 2 to 3 km. and beyond that a sudden decline comes. There is a sharp increase in the trend upto 7 kms. The fluctuating trend is observed upto periphery. Most of the scheduled tribes immigrated from the distant places and have settled near the city upto 7 km. area. They prefer to settle around the urban areas so that they could easily visit the city for daily work.

In zone one, there exists a positive correlation between scheduled tribes and other variables. The correlation values vary from 0.990 with residential houses to -0.993 with scheduled caste at 1 per cent level of significance. In zone second, many of the variables are negatively correlated with scheduled cast population. The correlation values vary from 0.873 with tertiary workers to -0.907 with population growth at 5 per cent level of significance. Such relationship shows that there is no more growth among the scheduled tribes population and most of them are engaged in tertiary activities. Zone third shows a negative correlation between scheduled tribes and the other variables. The correlation values vary from 0.797 with primary workers to -0.957 with secondary workers. This shows that most of the scheduled tribes are engaged here in primary activities. In zone four, the correlation values vary from 0.636 with dependency ratio to -0.707 with population growth.

The region as a whole reveals that there exists a high correlation with some variables. The correlation values vary from 0.856 with scheduled caste population to -0.894 with literacy. Thus the region as a whole reveals that the scheduled tribe population is generaly living along with scheduled caste and most of them are illiterate.

Figure 3-22 shows that there are three categories of distribution of scheduled tribe population. These are low category of less than 10 per cent, medium category of 10 to 30 per cent and high category of more than 30 per cent. The whole environs is divided into two parts. First, the entire eastern region is totally vacant of the scheduled tribe population except a small patch of low category which is observed

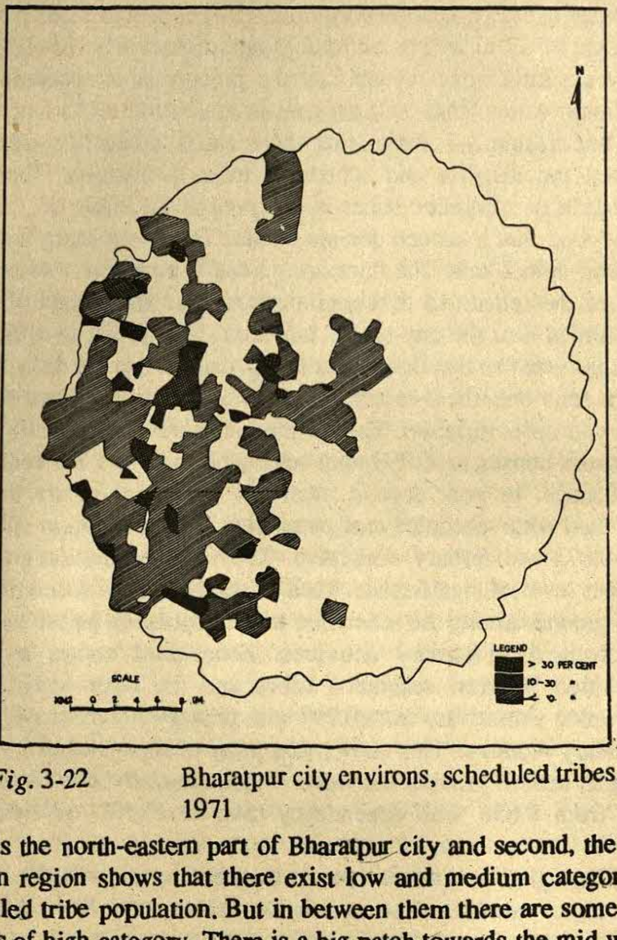


*Fig.* 3-22 Bharatpur city environs, scheduled tribes, 1971

towards the north-eastern part of Bharatpur city and second, the entire western region shows that there exist low and medium categories of scheduled tribe population. But in between them there are some small patches of high category. There is a big patch towards the mid west in Rundh Helak village shows medium category. Likewise other narrow strips and small patches of medium category are observed throughout the western part.

The only 24.70 per cent of the total settlements of the environs has scheduled tribes population. The tehsils Mathura and Kiraoli do not have a single scheduled tribe. Thus the whole environs is very poor for the distribution of scheduled tribe population. It is concluded that the scheduled tribe population exists only towards the western environs. Their growth is very poor and most of them reside in the immediate environs of the urban centres. The overall analysis reveals that Bharatpur city shows its influence upto the radius of 15 kms.

### Dependency Ratio

The mean dependency ratio of the whole city environs is 2.69. This is high as compared to the 2.04 of the nation. The maximum dependency ratio of 4.43 and minimum ratio of 2.27 are confined in 5 to 6 and 3 to 4 km. circles. Analysis based on six-kms.-zones reveals that the first zone has maximum dependency ratio of 2.83 whereas the fourth zone has the minimum of 2.64. Table 3-7 shows that the dependency ratio of 2.83 in the first zone is due to Bharatpur city and 2.73 in the third zone for Kumher.

In the first zone, there exists a low correlation between dependency ratio and some other variables. The correlation values vary from 0.848 with medical facility to -0.844 with infrastructure. Second zone shows the correlation values which vary from 0.890 with literacy to -0.869 with medical facility. It is because of the areas of 8 to 9 and 9 to 10 km. do not have even minimum scores for medical facility. In the third zone the correlation values vary from 0.880 with literacy to -0.961 with population growth. Such relationship shows that the population growth is negative for the non-working class. In the fourth zone, the correlation values vary from 0.636 with scheduled tribes to -0.768 with secondary workers.

Similarly, the region as a whole shows the high correlation between dependency ratio and the other variables. The correlation values vary from 0.943 with tertiary workers to -0.966 with primary workers. Appendix 2-K shows that there exists a positive relationship of dependency ratio with secondary workers, tertiary workers, scheduled caste, population growth and social amenities.

Figure 3-23 depicts that there are four categories: The first very low category records less than 1.5 ratio; the second low category records the ratio (1.5 to 2.0), the third high category records the ratio between 2.0 and 3.0 and the fourth very high category records the ratio more than 3.0. The region as a whole shows that there exists a very high dependency ratio near Bharatpur and the big settlements along the national and state highways. A big patch of very high dependency ratio is observed to the north-west in the third zone. There is a belt to the south-eastern part in the third zone. The low dependency ratio is observed throughout the environs in the form of small patches.

Similarly very low dependency ratio is confined in different places. Rest of the area enjoys with high category of dependency ratio.

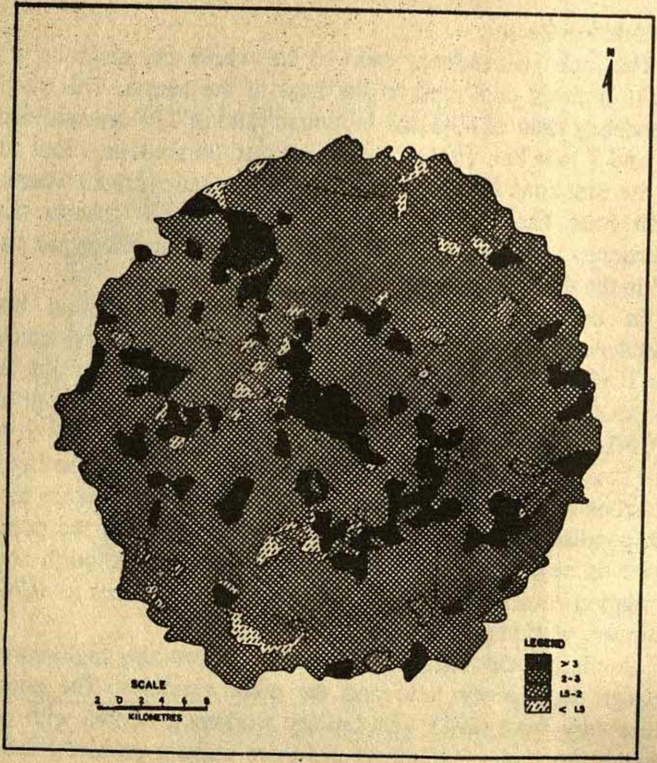


*Fig.* 3-23 Bharatpur city environs, dependency ratio, 1971

It is observed that people face several seasonal unemployment, however, they are counted as independent because they are found working at the time of enumeration. This may be one of the reasons for low dependency ratio. A large number of dependent people are supported by one earning person in the more developed and advanced areas while there exists surplus labourers in the form of disguised unemployment and counted as independent which further lowers down the dependency ratio.

Both the hypothesis are therefore confirmed because (i) There exists an inverse relationship between the distance with the dependency ratio and (ii) the towns and the large settlements have high dependency ratio.

Taking the demographic variables, we thus arrive at the conclusion that there exists a positive relationship among the variables of density sex ratio, scheduled cast, scheduled tribes and dependency ratio. These variables are inversely related to the distance which are dominant in the core. These above stated variables are negatively related with population growth and literacy.

Demographic structure of a region is intimately related to its physical, economic, social and cultural environment. The study of population clearly shows that the human kind is unevenly distributed over the landscape. Despite the pressures of the population explosion, vast area of the landscape remain empty. In the same way that population density varies, spatial variations exists for birth rates, death rates, and rates of population growth. Age and sex characteristics also differ from year to year, and it can be illustrated using population pyramids. The high rate of population growth any where is definitely acting as a negative factor in her economic growth. Additional programmes beyond family planning will unquestionably be required in order to halt the population explosion. The relationship between the distant zones and the demographic structure of settlement pattern shows a positive relationship among the variables of density, sex ratio, scheduled caste, scheduled tribes and dependency ratio. These variables are dominant in the core of city environs.

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## 4

# RESIDENTIAL LANDSCAPE AND SETTLEMENT DISTRIBUTION

Residential land comprises a greater share of the developed cultural landscape of any city than does any other single land use type[1]. The residential landscape of city does not only effect its own settlement pattern but also the distribution of settlements of the environs.

Settlements study has long been recognized as one of the essential elements of human geography. Vidal dela Blanche, Brunhes, Febvre, Meitzen and Demangeon, in varying degree, examined the complex interaction of man with his physical and cultural environment. And settlements do have the location and this is definitely guided by many factors. Over an area the distribution of settlements may have a definite pattern or may not have. And also the area varies in the degree of concentration and distribution of settlements. In this chapter, an attempt has been made to study the residential landscape of Bharatpur city and the distribution of settlements within the radius of 24 km. (the environs of the city). A profile of the spatial distribution of settlements may help to provide the suitable social amenities and infrastructural facilities for the future planning.

### The Residential Landscape of Bharatpur City

More than one-quarter of the total area of Bharatpur municipality is under residential use. Almost all the parts of the town are under the residential use in a large or small measure. The single family residence usually is the most common type of housing unit in the city.

### Zonation of Residential Areas of the City.

With regard to the location of residences within the city and the land occupied by dewllings of urban residences, it is apparent that; 1. They are not evenly distributed within the urban areas. 2. There are spatial differences in their density. 3. There are physical structural differences in residential areas. 4. There are quality variations of dwelling units.

To place the matter in the perspective of time during which the city increased in population and expanded in areal dimensions, we first have to consider the location of residential areas within the city as it first developed. When the population of the urban centre increased with time, residential sites were developed to accommodate the additional inhabitants.

The first node of residential development was in close proximity to the southern gate of the fort (near the Chouburja). The major reason for this early development of a roughly concentric residential zone was that it provided ready access for all urban dwellers to the centre of urban activity. All residents were therefore, near the point of minimum aggregate travel of the vibrant city.

When the population of the urban centre increased with time, residential sites were developed to accommodate the additional inhabitants. Some of the expansion of residential areas came in the form of areal expansion of already established concentric zone around all the three sides of the fort except north. The result of this was that some residents fell relatively distant from place of urban employment and business activity.

In response to this development, new routes were developed and constructed, linking the more distant residents with core of the city. In terms of zonation of residential areas, the original concentric residential zone was altered by extension of residential settlement within the walled city. Much of the demand for housing in the city at the general period of the city development came from new arrivals or those surrounding the walled city. They provided the work force for the expanding and flourshing urban industries in the north of the city. Workers came to the city and provided demands for housing. These demands tended to be met by housing facility in the walled city residential area, adjacent to major mass transport lines, specially those connected with factories on the margin of the city.

The density of inhabitants became very high. This in turn resulted in many distance apartment structures. Therefore, the form of this residential zone was and is quite different from that of the original concentric residential zone with its free standing dwelling units. With the lapse of time and increase of population, still another type of residential zone came into being. This was the residential area towards the outer city wall and even beyond.

### The Residential Area may be Divided into the Following Ways:

1. Aristrocratic buildings or on the fort's style.
2. Unplanned residential area of walled city.
3. Planned area of extra walled city.
4. Slums.

### Aristocratic Buildings

This group includes the fort, palaces and big havelies of Jat sardars in the walled city or outside the city wall. In the centre of the city built on a level surface, is the famous masonary stone fort of square dimensions that was built by Maharaja Surajmal in 1733 A.D. The red sandstone is also used in its construction and the fort is important from the view point of safety. Laxman mandir, Ganga mandir, Jama Masjid, Kisori Mahal, Kamra Khas, Museum and other buildings inside the fort are built in fine architectural style of red sandstone. Moti mahal in the east and Motijhil kothi in the west (At present the residence of Maharaja Brijendra Singh and Maharaja Man Singh) are fairly good example of architecture. There are about forty havalies in and just out of the city wall. These give an impression of good architecturral designs. The Jat sardars and Maharaja's servants lived in these havelies. Most of them have been ruined or partly ruined and some of them are lying vacant.

### Unplanned Residential Area of Walled City.

Bharatpur is a medieval city developed around the fort. It has the maximum concentration of residences and thinning toward the margin of the city or city-wall. The central part or the area around the Laxman-temple is over crowded, having the density of 587.7 persons per hectare and on an average 104 houses per hectare. The high density of persons and houses are due to the early tradition of living inside the city wall for safety and being as near the core point of the city as possible to make higher contacts with the shopping centres and Laxman temple, a religious centre. The market centres from Mathura gate to Kumher gate are very close to the residential houses and generally people live within a five minutes walking distance from their work centres and shops. The condition of the houses is poor and do not have modern amenities. The houses are generally congested and unplanned. The structure of the houses in Gopal garh and Namak ka katla is very poor. There mostly the people of low income group live. The roads, streets and lanes in the residential areas are very narrow and irregular. Moot ki gali near

Laxman mandir is hardly one metre wide. No open space is left for any other activity. This is due to the unauthorised construction on government land. Most of the facades of the houses are in disorder and incomplete condition. Walled city is a multifunctional area and includes wholesale and retail markets, administrative offices, educational institution, bank and post offices.

**Planned Residential Area of Extrawalled City**

The planning for new areas outside the city wall has been made at different times. The first mandi planned out side the Gowardhan gate was initiated by Maharaja Brijendra Singh in 1945. The mandi is in the form of square dimension and the residences of the shopkeepers are on the first floor of their shops.

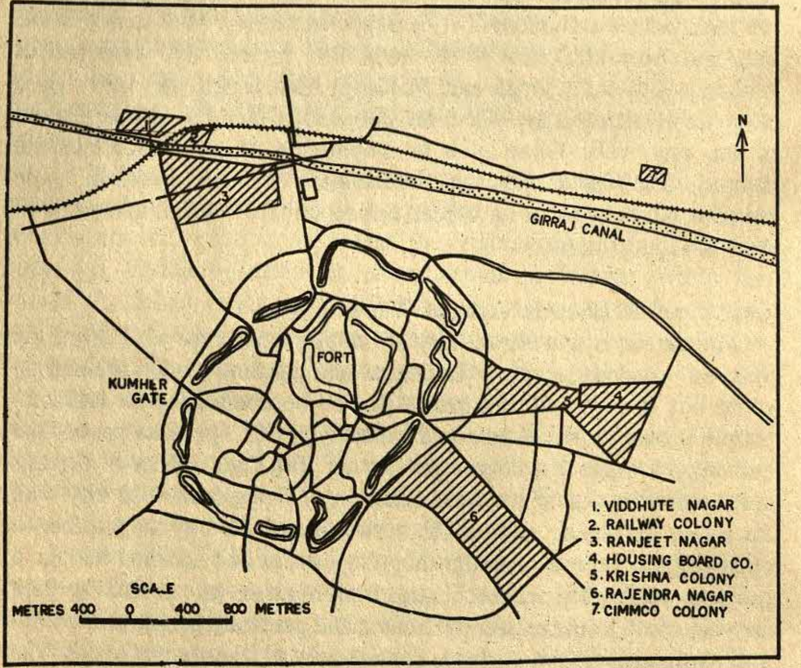


*Fig.* 4-1 Bharatpur, location of new colonies

The planning of 'Cimmco' colony was made at the time of establishing the factory in 1961. The residences for officers and clerks with all the modern amenities are located inside its campus.

Now the Urban Improvement Trust has framed certain regulations regarding the proportions of open spaces around the builtup areas in residential landscapes. There are seven planned colonies which have either been completed or under completion. (Fig. 4-1) These colonies cover a total area of about 126.14 hectares out of which 56.55 hectares of land under residential use outside the city wall, resulted in the segregation of different cultural or residential groups in the planned areas. Thus the old residential buildings and old business district within the walled city have been vacated by the rich persons and occupied by the middle and lower class people. Residential shifting by the people in the new developing colonies is going on. Thus interior of the city degraded and the newly developed colonies outside the city wall have been upgraded so far as the standard of living is concerned.

### Mohallas of the Walled City

There are 70 mohallas and 10 gates in the walled city. (Fig. 4-2) All the mohallas are enclosed by a circular road that is at a distance of 100 or 150 metres from the principal gates. All the mohallas are classified into the different categories according to the house condition and the standard of living of the residents.

### Very poor mohallas

Namak ka katla and other mohallas located near the Chandpole, Suraj pole, Atalband, Neemda, Zagina, Anah and Benarain gates are occupied by labour class people and their houses are very dirty, ugly and partly constructed. There is no proper sewage system. It is noted that more than 20 per cent houses are in ruined condition and those were used for residential purposes nearly ten or fifteen years ago. The residents are mainly Jatvas and Malies. Namak ka katla, the biggest mohalla, is the residential area of Lawania Sikhs. They are very poor and their main work is rope making or rikshaw driving. Here there is no water facility even for drinking purpose. It is a low lying area and generally gets three to four feet water in the rainy season because of Namak ka katla has been very wealthy and flourishing part of the city for the salt production. Here more than 40 per cent houses are kaccha structures. The total land under these mohallas is 33 hectares.

### Poor mohallas

The mohallas just inside the mud wall of the city are poorly developed. These 30 mohallas are there where mostly working class people like tonga drivers, utensil makers, vegetable seller, karigars and industrial workers reside. The houses do not have proper lavatories and bath-rooms because 30 per cent of them are kaccha structures. In Machli mohalla, two or three families are living in the campus of buried ground situated in the north near Govardhan gate. Mohalla Atal bund is the biggest in all poorly developed mohallas where mostly jatwas, malies and mohamadans are living.

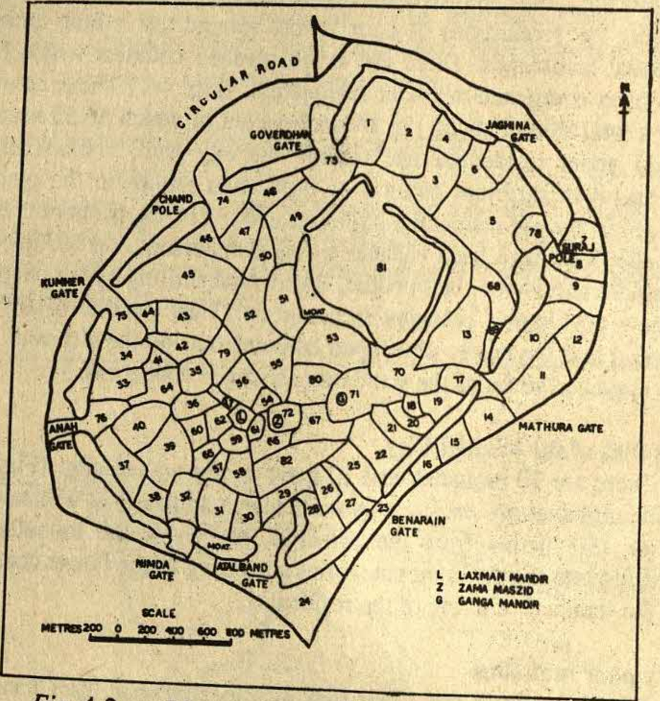


*Fig.* 4-2 Bharatpur, mohallas within circular road

### Fine mohallas

Aadarsh colony, Kayasth colony, Pahi bagh, Chipiyo ka mohalla, Jati mohalla, Beyanian mohallas, Barsania mohalla and Girray colony (inside the fort) are known as fine mohallas according to the construction and the status of the people. Mostly Baniyas, Brahamans, Jains and Mathurs are residing in these mohallas. Here all the facilities like water, electricity, proper sewage system, pucca street and lavatories, etc. are available. Girraj colony is developing inside the fort where the land was sold by Maharaja Brijendra Singh. Newly constructed building in Girraj colony have all the modern amenities. The total area under these mohallas is 17.25 hectares.

### Middle class mohallas

There are 22 mohallas, mostly located behind the Laxman mandir, Jama masjid and Ganga mandir fall under the middle class mohallas. The houses have lavatories in the front parts. The streets are vary narrow like Moot ki gali, that is only one metre wide with no proper sewage system. The houses within the mud wall are generally small, old and poor facades. The whole area within the wall basically lacks settlement planning. Therefore, the author has categorized it as unplanned residential landscape with different standards.

### Unplanned Residential Area between Wall and Circular Road

When the population of the walled city increased with time, residential sites were developed out of the city wall to accommodate the additional inhabitants but limited by circular road. Such mohallas are Jatwa mohalla, Mali mohalla, Gulal kund, Goal bagh road, Thakuro ka mohalla, Rasala mohalla, Mochio ka mohalla, Jagratha mohalla, Nai basti and Gujaro ka mohalla. It is also an extended unplanned residential area of the walled city which came out of the principal gates. The house structure is very poor in all the mohallas except Thakuro ka mohalla and Rasala mohalla. The total land under these mohallas is 33.75 hectares. Name of the mohallas within the circular road including the walled city are given in Appendix 3-A.

### Unplanned Residential Area Out of the Circular Road.

Ram Singh ka nagla lies towards the right side of the road which runs from station to Bajariya or upto the Girraj canal. Previously it was called Idu mohalla, Idu, a Mohammadan railway employer lived here. With effect from 1947 he had left Bharatpur and gave his property to Ram Singh, a hindu railway employee. Thus it became famous as Ram singh ka nagla which covers 4 hectares land. At present there are 80 houses here and it should contain nearly five hundred population.

Patpara mohalla is lying behind the collectorate and has 50 households mainly of jatwas. It covers 0.56 hectare land for residential purpose.

### Slums

The houses that have deteriorated from their original habitable stage and those that were never fit for human habitation may be called slum. The term 'slum' originally was used in reference to social group as much as to a particular section of the city where the social pathologies of alcohalism, disordered family life, prostitution and the like, etc. were common occurrences. In addition, slums are neighbourhood with given structural characteristics. They are old, the houses are aesthetically displeasing to the slum definer, the rents are relatively low and the houses are crowded. Consistent with the concept of slum the term has both physical and social connotations--a particular social group occupying discreet housing setting. In Bharatpur city, the slum areas are:

1. **Harijan basties**
    - (i) Harijan basti outer Mathura gate.
    - (ii) Harijan basti, Gulal kund papdi.
    - (iii) Harijan basti, outer Chand pole gate.
    - (iv) Harijan basti, outer Gowerdhan gate.
    - (v) Harijan basti, outer Kumber gate.
    - (vi) Harijan basti, inside Anah gate.

All these Harijan basties are covering 6.5 hectares of land with 2,500 population. There are 520 households in all basties.

2. Inside mohallas of Suraj pole gate and Chand pole gate there are also slums. The house structure is very poor and full of dirt. There is no sewage system and no proper roads. The total area under these mohallas is 5.5 hectares. Mostly jatwas and malies are living here.

3. Some prostitutes are residing at Malahe outside the Atal bund gate. It is also a slum area of the city which includes 20 households and covers 1 hectare land.

4. Northern part of Namak ka katla and eastern part of Gopal garh are also slum areas of the city.

5. Mohalla Tofani is lying towards the right side of Murli Chitralok at railway station. It covers 2.5 hectares land with 80

households and 400 population. There is a dirty pit in the centre of the locality and therefore, the people generally suffer from malaria. No water and electricity exist here. Workers of railway department reside here.

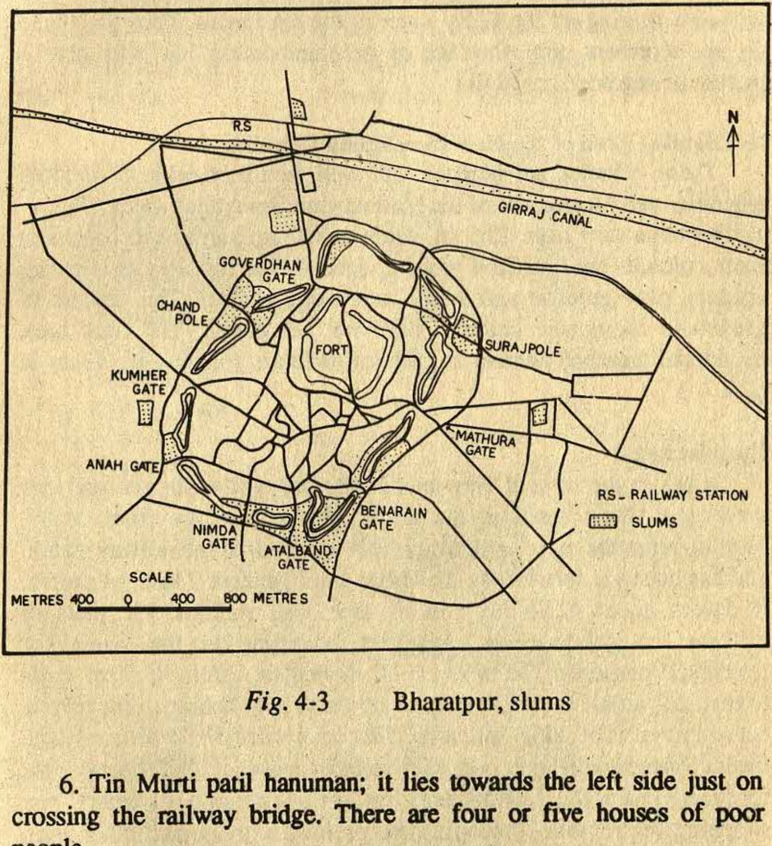


*Fig.* 4-3 Bharatpur, slums

6. Tin Murti patil hanuman; it lies towards the left side just on crossing the railway bridge. There are four or five houses of poor people.

In these slums, the houses are old with ugly facades, which neither have lavatories nor bathrooms, nor even taps. All these localities give a rural impact. A large number of houses in these slums are made either of ordinary bricks or mud in the style of hut. The slum areas are covering 17.00 hectares of land that form 4.8 per cent of the total residential landscape. (Fig 4-3) Generally slum dwellers are poor, illfed, illdressed and illiterate, etc. These localities are the main sources of epidemics and diseases. The people, living in the mohallas near the mud wall use the walls for easing out. In the rainy season the localities become very dirty as the water flows from the mud wall to the mohallas bearing all the filthy water in the residences. Thus the slums do not represent only shortage of accommodation but also give a picture of degraded social life.

### Residential Area of the New Developing Colonies

These colonies are planned and well furnished with all modern amenities and located out of the Mathura and Goverdhan gates. (Fig. 4-1) The plots vary from 48.5 sq. yards to 800 sq. yards. The houses in these colonies are open and properly spaced. The colonies have parks, schools, play grounds and small marketing centres. The process of growth in these new colonies have not yet ended. The total area, residential area and number of plots of different colonies are given in table 4-1.

### Ranjeet nagar

It lies in the west of New mandi situated on the station road and meets the Girraj canal in the north. This one is the first colony, developing in the extra walled city. It is very near to the railway station and has been put forward by the Urban Improvement Trust. At present it covers about 42.86 hectares of land and contains 582 plots of different categories (Five categories according to the sizes) for residential purposes. The plots are of varying size, from 85.5 sq. yards to 600 sq. yards. Maximum number of plots (369) belong to the middle category that is of 266.6 sq. yards. This colony has 19.94 hectares land meant for residential purpose, 4.95 hectare for parks, 12.72 hectares for roads.and rest of the 7.74 hectares land for one community centre, one shopping centre with 30 shops, three primary schools, and other open spaces. The roads are 30.40 and 60 feet wide in the colony. Mostly the service class people are living here. The colony was named after the name of Maharaja Ranjeet who succeeded Bharatpur in 1777 A.D.

### Rajendra nagar

This is a proposed colony and its area lies to the right side of the collectrate road and meets the Rest house in the south east. (Fig. 4-5) It has 446 plots of different categories and covers an area of 33.2 hectares of land, out of which 10.80 hectare alloted for residential purpose.

**Table 4-1**

**New developing colonies (Bharatpur city)**

| S. No. | Name of the colony | Area of colony in hectares | Area of residential land in hectares | No.of plots |
|---|---|---|---|---|
| 1. | Ranjeet nagar | 42.86 | 19.94 | 582 |
| 2. | Krishna colony | 30.00 | 19.70 | 525 |
| 3. | Rajendra nagar | 33.20 | 10.80 | 446 |
| 4. | Housing board colony | 2.89 | 1.72 | 195 |
| 5. | Cimmco colony | 7.89 | 1.69 | 310 |
| 6. | Railway colony | 6.20 | 1.90 | 375 |
| 7. | Vidduta nagar | 3.10 | 0.80 | 25 |
| | Total | 126.14 | 56.55 | 2433 |

Source: 1, 2, and 3 Urban Improvement Trust Bharatpur 1978.
4 Executive Engineer,Rajasthan Housing Board Jaipur.
5 Building Department Cimmco factory.
6 D.R.M. Kota, W.Railway, Kota.

There are seven categories of the residential plots ranging from 108.9 sq. yards to 484.5 sq. yards. It has 5.44 hectares of land for commercial activity, 0.02 hectare for schools, 7.36 hectares for roads, 3.36 hectares for open parks and 0.36 hectare for public and semi public places. Maximum number of plots (155) are in the size of 213.3 sq. yards. The colony is very near to the boys college, Mathura gate and Rajasthan roadways bus stand. The collectrate, schools and other government offices are also very near to this colony. The houses usually occupy a central position in their plots and have small open spaces. The roads vary from 30 to 60 feet inside the colony.

**Krishna colony**

Krishna colony lies in the east on the college road that is nearly 2 fur-longs from the Mathura gate. This colony has also been put forward by the Urban Improvement Trust. It contains 525 plots of different categories (13 categories according to the sizes) and covers an area of 30 hectares. Out of the total area, 19.70 hectares land is meant for residences and rest of the 25.74 hectares for roads, schools, commercial area and other open spaces. This scheme provides the plots of varying size from 85.5 sq. yards to 800 sq. yards. According to the situation this colony is very near to the M.S.J. college in the east and the marketing centre and Rajasthan roadways bus stand at the Mathura gate. The roads are 40 to 80 metres wide inside the colony.

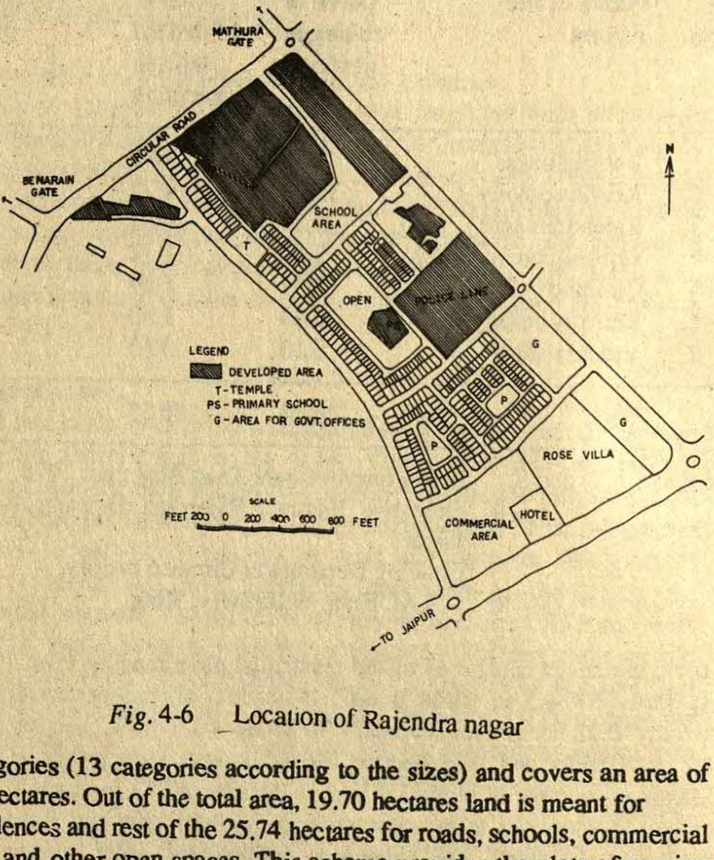


*Fig.* 4-6 Location of Rajendra nagar

### Colony of housing board

It is nearly half km. from the Mathura gate and lies towards the right side of Krishna nagar. This scheme was prepared by Rajasthan housing board, Bharatpur. It contains 195 plots of four categories and covers an area of 2.89 hectares of land, out of which 1.72 hectare are for residential purposes. Remaining 0.70 hectare is for roads and 0.44 hectare for parks. There are three parks inside the colony. (Fig. 4-7) The colony has no commercial centre because it is very near to the Mathura gate, a developed commercial area. The colony provides plots of varying size, from 44.6 sq. metres to 162.4 sq. metres. Majority of the plots (66 per cent of the total plots) belong to the small size which are mainly workers and low income group people.

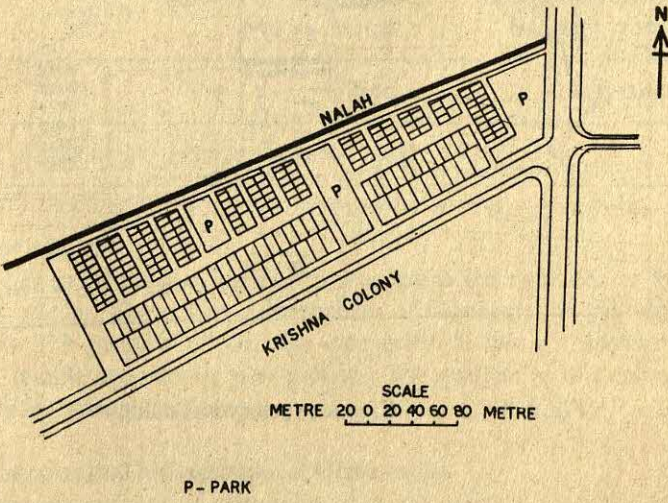


*Fig.* 4-7 Housing Board colony

**Cimmco Colonies**

Central India Machinery Manufacturing Co. Ltd., has its own colonies for officers, workers and jamadars. The total residential land under these three colonies is 1.69 hectares. (Fig. 4-8)

(A) *Officer's colony:-* It lies to the left side of the factory with all the modern amenities. There are three big plots for President, Vice-President and Joint President which cover an area of .076 hectare. Besides these, it contains 108 quarters of different categories and cover an area of .87 hectare of land. It has one guest house, club, stage, garden and school. The roads inside the colony are 8 to 10 feet wide. The size of different quarters is given in following table:

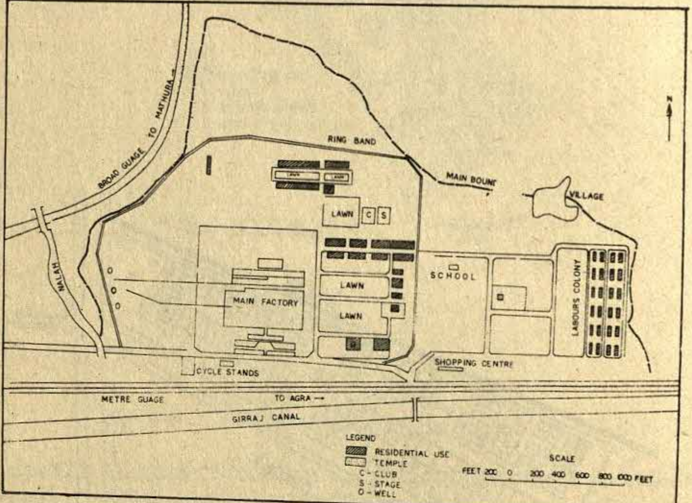


*Fig.* 4-8 Cimmco factory and colony

(B) *Labour's colony* :- It is lying close to the eastern boundary of the factory. There are 24 blocks and have 192 labour quarters of the size of 37.2. sq. metres. One park and labour well-fare centre are also in this colony. The total area under this type residential use is 0.71 hectare.

(C) *Jamadars colony* :- It lies to the north-east of the officers colony. There are 10 quarters of the size of 31.3. sq. metres each.

The total land under these three colonies is 1.69 hectares for residential purposes whereas parks and lawns cover 6.2 hectares of land.

**Types of quarters (Table 4-2)**

| Type | Size | Number of quarters |
|---|---|---|
| $A_1$ | 197.9 sq. Metres | 4 (Doubled storeyed) |
| A | 118.8 Sq. Metres | 11 (Single storey) |
| B | 94.0 sq. Metres | 24 (Single storey) |
| C | 57.8 sq. Metres | 12 (Single storey) |
| D | 72.3 sq. Metres | 12 (Single storey) |
| E | 68.9 sq. Metres | 35 (Single storey) |
| F | 64.0 sq. Metres | 6 (Single storey) |
|  | Total | 108 quarters |

Source : Building Department Cimmco Factory, 1978.

**Railway colony**

It lies to the north of the city or attached to the right side of the railway station. The colony covers about 6.20 hectares of land and contains 375 quarters of different categories. It has a dispensary, school, temple and two big play grounds. The quarters of this colony are only for railway employees.

**New Colonies and a Geographical Observation**

The development of new colonies in old cities is essential for healthy environment and quality of life. But in Bharatpur city the flood water which flows from north-west to south-east affects the Ranjeet nagar, Railway colony and Cimmco colony. The present Ranjeet nagar is situated in a depression and there is no exit for the water when area is inundated by breaches in Motijhil or Ajan canal as happened in 1967 and 1977 or by local incessant rains. The other three colonies situated to the east out of the Mathura gate, having better location but are affected by local rains as there is no proper drainage system.

### House

The house is one of the most common features in the cultural landscape. In fact, the house can be a useful factor in the analysis of landscape. In India, every expanding city needs a constant increase in the number of houses with the increase of population. The table below shows the growth of the houses in Bharatpur city:

**Table 4-3**

**(Growth of the houses in Bharatpur city)**

| Year | No. of houses | Population |
|---|---|---|
| 1931 | 5,360 | 30,173 |
| 1941 | 5,943 | 35,541 |
| 1951 | 6,249 | 37,321 |
| 1961 | 6,554 | 49,776 |
| 1971 | 11,794 | 68,036 |

Source - District Census Hand books, Rajasthan. 1971

There has been a marked rise in the number of houses from 1931 to 1971, and rate of growth is increasing from decade to decade. (Table 4-3) From 1931 to 1961 the number of houses increased by only 1194 whereas the population increased by 19,603. The slow growth of the houses is mainly due to the following factors:

(1) There were many temples and mosques in Bharatpur city. These religious buildings are used for residential purposes.

(2) Inside the walled city, many ruined houses are repaired for living purposes.

(3) The partition of big buildings was caused by the disintegration of joint families as a result of which every departing partner carved out his share in the old house.

(4) Poor economic condition of the people is also one of the factors for the slow growth of the houses in the city upto 1960.

But in the decade of 1961-1971 the number of houses increased from 6,554 to 11,794 or nearly doubled whereas the population increased by 18,260 during the same period. From 1931 to 1961 there were 16 people per house while from 1961 to 1971 the number decreased to 3.5 people per house. Thus the crowding of people with regard to houses has gone down. It is due to the coming up of a large number of new residential colonies in the new areas outside the city wall as a consequence of industrial development. With the high growth of the population, the Urban Improvement Trust Bharatpur and Rajasthan Housing Board Scheme too, are encouraging the people to build their houses. At present four colonies are developing and a large area towards the west of Ranjeet nagar has been proposed for residential purposes.

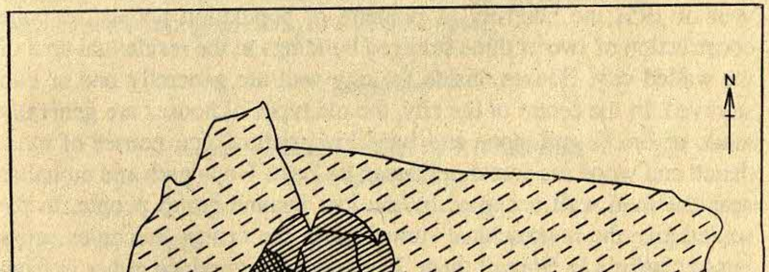


*Fig.* 4-9 Bharatpur, house density, 1971

## Density of the Houses

The author calculated the densities of the houses and prepared a density map of the town. This map clearly shows that the highest density of houses (104 houses per hectare) is confined to ward number 16 in the centre of the city which is irregularly settled in front of the Laxman mandir. There are neither open spaces nor any park or play ground except a network of irregular streets. High density from 75 to 100 houses per hectare is found within the walled city in ward 5. Medium density, from 50 to 75 houses per hectare is seen within the walled city in wards 4, 13, 14 and 18. The lowest density, upto 5 houses per hectare is confined in ward number 1, 7, 8 and 21. The density map (Fig. 4-9) brings out clearly the fact that the larger wards, have lower density of houses and the smaller wards have higher density of houses.

## House Type

In the walled city, the house pattern is clearly seen with old style, but in the new colonies the uniformity and new styles are observed by planning. After the formation of the city in 1733, the two or three storeyed havelies were constructed only in the campus of fort. From the year of 1951 the intensity of pressure of population necessitated the construction of two or three storeyed buildings in the residential area of the walled city. Houses, inside the city wall are generally one or two storeyed. In the centre of the city, the old types of houses are generally made of bricks and stone and have low roofs. Some houses of mud, thatch and wood are found in Namak ka katla, Gopalgarh and mohallas near the mud wall occupied by the low income group people. In the walled city the houses have varandahs in the centre, balconies and a raised platform in front of them. Lavatories are provided either in front or in the back side of the houses on the first floor or at the ground floor.

## The House Plan in the Colonies (Extra Wall City)

In extra walled city, the houses are generally single storeyed built in new style and in-habited by those persons who are either in service or in business. The officer's quarters in Railway colony and Cimmco colony have a drawing room, study room, bed rooms, stores, bathroom and lavatory. Varandahs are generally in the front side. In all the new developing colonies, ceiling height is usually 10 to 12 feet at the ground floor and 8 to 9 feet on the first floor. The foundation of the houses is generally three to six feet deep from the surface level. The development residential areas outside the city wall is due mainly to industrial development.

**Building Periods**

There have been cycles of high and low building activities. The study of building activity shows that specific periods can be assigned to the building activities over the past 245 years. The generalised periods fall most readily into the following five periods:

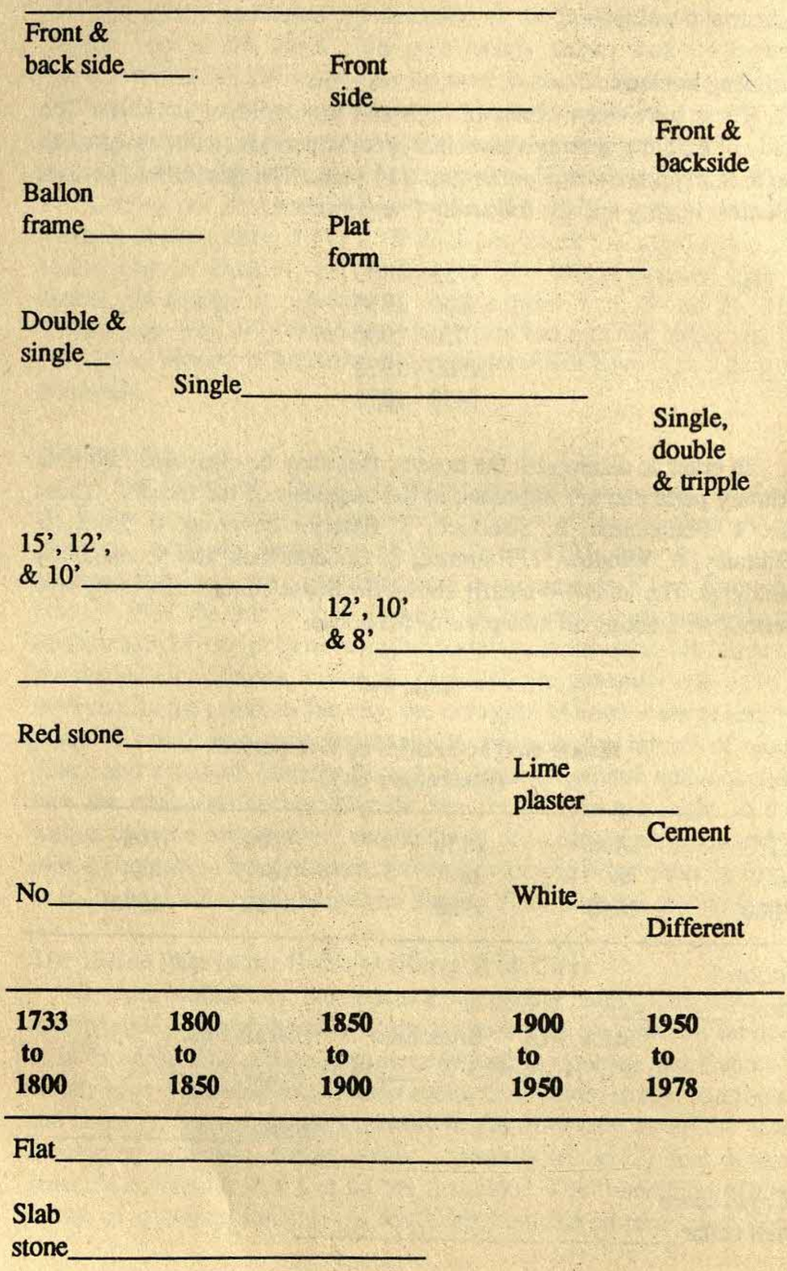
1733 - 1800
1800 - 1850
1850 - 1900
1900 - 1950
1950 - 1978

In order to distinguish the houses, they may be classified into nine primary parts that are important in the diagnosis of the facade[2]. These are: 1. Foundation, 2. Structure, 3. Exterior covering, 4. Roof, 5. Chimney, 6. Window, 7. Entrance, 8. General look and 9. Auxiliary buildings. The table 4-4 clearly shows the house characteristics by five periods with taking all nine parts of the house.

**Table 4-4**

**House characteristics by five periods**
**(Bharatpur city)**

| **1733 to 1800** | **1800 to 1850** | **1850 to 1900** | **1900 to 1950** | **1950 to 1978** |
|---|---|---|---|---|
| Stone & lime | | | | |
| | Brick Size<br>4".2".1" | Brick Size<br>4".3".2" | Brick Size<br>9".4«".3" | |
| | | | Cement | |
| Crawl space half cellar | | | | |


Front &
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Ballon
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double
& tripple
15', 12',
& 10'
12', 10'
& 8'
Red stone
Lime
plaster
Cement
No
White
Different
1733
to
1800
1800
to
1850
1850
to
1900
1900
to
1950
1950
to
1978
Flat
Slab
stone

**Cement concrete & slabs**

**At the ceiling of kitchen**

**Simple**

**Stone & bricks**

**Stone cutting with out door**__________

**Iron & wood**__________________

**Round square**_________

**Horizontal**______________

**Square verticle**

**Very small**_____

**Small**______________

**Small & large**

**1x1, & 2x2**___________

**2x2 & 3x3**_______________

| | | | | |
|---|---|---|---|---|
| | | | | 2x4,<br>4x4 &<br>6x6 |
| **1733 to 1800** | **1800 to 1850** | **1850 to 1900** | **1900 to 1950** | **1950 to 1978** |
| Iron & wood | —— | | | |
| | | Wood | —— | |
| Top round | —— | | | |
| | | Rectangle | —— | |
| Aristocratic | —— | | | |
| | | Simple | —— | |
| Garage (nil) | —— | —— | | |
| | | | | Attached |
| Attached | —— | —— | —— | |

Source: Compiled by the author.

In Bharatpur, the brick making is an important industry and therefore it is clear from table 4-5 that 78 per cent houses are built of burnt bricks and 6.5 per cent of unbrunt bricks. Nearly 14 per cent of the total houses are of masonary stone because of the non-availability of stone near by Bharatpur city. In connection with the roof materials, we found that nearly 70 per cent roofs of the houses are made of stone slabs and concrete and 21.9 per cent with grass leaves reed and bamboo. The stone slabs are easily available becuase of its large production at Hindaun 30 kms. south west of the city. The roof materials used in the construction of house are given in table 4-6.

**Table 4-5**

**The wall material per 100 houses used (Bharatpur city)**

| Grass, leaves reeds and Bamboo | Mud | Unburnt bricks | Burnt bricks | Wood | Stone | Cement | concrete |
|---|---|---|---|---|---|---|---|
| - | 1.4 | 6.5 | 78 | 0.1 | 14 | -- | |

Source - Bharatpur Municipality, 1978

**Table 4-6**

**The roof material per 100 houses used (Bharatpur city)**

| Grass, leaves reeds, thatched and Bamboo | Wood | Corrugated iron zink and other Metal sheet | Asbestos cement sheet lime slabs | Concrete and stone stone slabs | Other Material |
|---|---|---|---|---|---|
| 21.9 | - | 2.5 | 3.5 | 70 | 1 |

Source - Bharatpur city, Municipality, 1978.

### Table 4-7

### Number of persons per house with the relation of house and population

| Year | Population | Per cent increase | No. of houses | Per cent increase | No. of persons per house |
|---|---|---|---|---|---|
| 1931 | 30,173 | - | 5,360 | - | 5.6 |
| 1941 | 35,541 | 17.79 | 5,943 | 10.8 | 5.9 |
| 1951 | 37,321 | 5.0 | 6,249 | 5.1 | 5.9 |
| 1961 | 49,776 | 33.3 | 6,554 | 4.8 | 7.5 |
| 1971 | 68,036 | 36.7 | 11,794 | 79.9 | 5.7 |

Source - District Census Hand book Bharatpur 1971.

The number of the persons per house from 1931 to 1951 was almost the same but increased by 7.5 persons in 1961 due to high increase of population in the year. (Table 4-7) From 1961 to 1971 the population increases by 36.7 per cent whereas the houses increased by 79.9 per cent and thus the number of persons per house decreased to 5.7 per cent.

**Table 4-8**
**The houses and households in Bharatpur (1971) (Ward wise)**

| Number of wards | Houses per hectare | House Holds per hectare | Number of persons per house |
|---|---|---|---|
| 1. | 0.90 | 1.10 | 6.00 |
| 2. | 35.00 | 35.60 | 5.95 |
| 3. | 28.50 | 30.50 | 6.58 |
| 4. | 63.50 | 69.90 | 6.52 |
| 5. | 86.50 | 88.50 | 5.39 |
| 6. | 25.00 | 25.90 | 5.76 |
| 7. | 00.09 | 1.10 | 7.01 |
| 8. | 5.00 | 5.10 | 5.48 |
| 9. | 42.80 | 42.80 | 5.17 |
| 10. | 40.20 | 40.80 | 6.41 |
| 11. | 58.28 | 59.00 | 5.82 |
| 12. | 32.80 | 32.85 | 6.38 |
| 13. | 46.40 | 50.50 | 6.42 |
| 14. | 57.70 | 64.19 | 6.16 |
| 15. | 38.00 | 38.00 | 5.55 |
| 16. | 104.00 | 104.00 | 5.65 |
| 17. | 26.00 | 26.80 | 5.63 |
| 18. | 51.70 | 51.09 | 5.56 |
| 19. | 11.00 | 12.20 | 5.44 |
| 20. | 11.00 | | 5.33 |
| 21. | 2.00 | 2.20 | 4.42 |
| Total | 5.27 | 5.53 | 5.76 |

The residential condition is not satisfactory in any of the wards. The number of the persons per house varies from 4.4 in ward number

21 to 7 in ward 7. (Table 4-8) The average number of households per house is 1.04. The area of plots is generally large in the extra walled city. On the whole the residential land per capita is 0.006 hectare and the average share per household is 0.18 hectare.

## Settlement Distribution of City Environs

For the study of spatial distribution of settlements the methods of Lorenz Curve, B.J.L.Barry's settlement concentration and nearest neighbour distance statistics have been applied.

Before going into the details, the distribution of settlements in different size groups with respect to distance from the city has been described. Analysing this on the six km-zone basis, we find that 5 per cent of the settlements are located within a distance of 6 km from Bharatpur city, 25.26 per cent from 6 to 12 km, 32.96 per cent from 12 to 18 km and 36.48 per cent from 18 to 24 km zone. (Table 4-9)

While we analyse the density of settlements in different zones, it is observed that second zone has the highest density of settlements of 4.1 per sq. km of area. It is followed by first, third and fourth zone with density of 2.8, 3.2 and 2.7, respectively. In the fourth zone each settlement occupied 3.7 sq. km of area. It follows by 3.5, 2.4 and 3.1 sq. km in first, second and third zones. The highest density of settlements in the second zone is due to the scattering of a large number of smaller settlements all over the zone.

The settlements of the region may be grouped into the following population size groups :

A. Below 200
B. 200 to 499
C. 500 to 999
D. 1000 to 1999
E. 2000 to 4999
F. 5000 and above.

From the table 4-9 we find that there are 8.33 per cent uninhabited settlements in the whole environs. The only town in the region is Fatehpur Sikri which forms 0.18 per cent of the total settlements. Likewise, the settlements in the size-group of more than 5000, form 0.74 per cent. The settlements in the size-group of 2000 to 4999 form 5.75 per cent followed by 16.66 in the size group of 1000 to 1999, 27.22 percent in the size group of 500 to 999, 25.56 per cent in the size group of 200 to 499 and 15.74 per cent in the size group of less than

## Table 4-9
## Classwise No. of settlements with population (1971)

| Distance from the city | Uninhabited settlements | Less than 200 (A) | 200 to 499 (B) | 500 to 999 (C) | 1000 to 1999 (D) | 2000 to 4999 (E) | 5000 & above (F) | Towns (G) | Total Number ber of settlements | Inhabited settlements | Percentage of total settlements in the zone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Upto 6km distance | 2 | 4 | 4 | 11 | 3 | 2 | 1 | - | 27 | 25 | 5 per cent |
| 6 to 12 km. | 21 | 28 | 40 | 31 | 15 | 3 | - | - | 138 | 117 | 25.56 " |
| 12 to 18 km. | 8 | 33 | 59 | 40 | 25 | 11 | 2 | - | 178 | 170 | 32.96 " |
| 18 to 24 km. | 14 | 20 | 35 | 54 | 47 | 15 | 1 | 1 | 196 | 182 | 36.48 " |
| Bharatpur city invirons | 45 | 85 | 138 | 147 | 90 | 31 | 4 | 1 | 539 | 494 | 100.00." |
| Percentage of the total settlements of city environs | 8.33 | 15.74 | 25.56 | 27.22 | 16.66 | 5.75 | 0.74 | 0.18 | 100 | 91.66 | |

200 population. Thus the C, D and E size groups of settlements are generally seen to be clustered more towards the outer zones rather than the inner zones.

## Measures of Concentration of Settlements

(1) *Lorenz curve :* The degree of concentration is higher, if the settlements are assembled in a particular region but the settlements here are evenly spaced. The nature of economic development in different parts of the region also depends on the concentration of the settlement. Therefore, the Lorenz curve has been used for the study of degree of concentration. Generally, two observations are found through this curve. First, if the curve follows the diagonal trend, then a uniform distribution of settlements may be observed, and second if the curve coincides with the x-axis then the settlements are concentrated in a particular part in the region. From the figure 4-10, the curve reflects that there is no concentration of settlements.

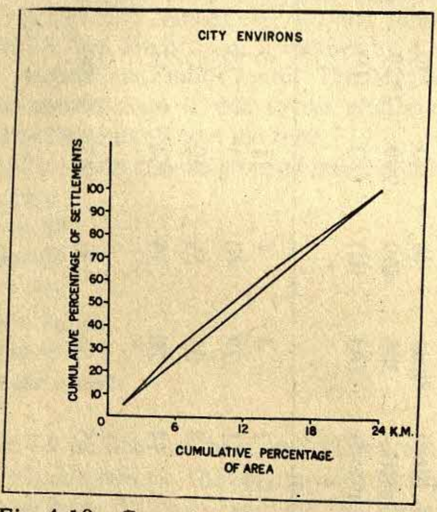

*Fig.* 4-10 Concentration of settlements by Lorenz curve

From the appendix 3-B it is apparent that 25 per cent area has 30 per cent settlements, whereas in the remaining 75 per cent area the remaining settlements are distributed. This reveals a tendency towards the uniformity because it coincides or follows the diagonal.

(2) *Quantitive technique :* In order to describe the distribution of settlements and their pattern a quantitative technique has been used. For this, Bharatpur city environs covering four topographical sheets (No. 54 E/7, 8, 11 and 12), is divided into four parts so that the degree of concentration of settlements may be determined in each of them. Each part is comprised of 576 sq. km in perfect square shape. Again, each part of the environs is divided into 64 equal sub-squares of 9 sq. km each. In each square the number of settlements are counted. Part A of the table 3-10 gives this transformed picture for north-west environs, B gives for north-east environs, C gives for south-west environs and D gives for the south-east environs. Thus the maps are converted into manageable statistical form.

**Table 4-10**

**(A) 54 E 7**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 2 | 1 | 2 | 1 | 0 |
| 2 | 1 | 1 | 1 | 3 | 1 | 0 | 2 |
| 2 | 1 | 2 | 2 | 1 | 2 | 3 | 2. |
| 2 | 0 | 3 | 4 | 2 | 5 | 3 | 1 |
| 2 | 2 | 3 | 3 | 2 | 5 | 2 | 3 |
| 1 | 4 | 4 | 4 | 4 | 7 | 4 | 3 |
| 2 | 2 | 4 | 4 | 2 | 4 | 5 | 3 |
| 1 | 1 | 5 | 3 | 6 | 6 | 4 | 2 |

Total No. of Settlements = 158
Total No. of unoccupied sub-square = 3
Therefore unoccupied area = 3x9
27 sq.km
Total area of topo sheet = 9x64
576 sq.km

**(B) 54 E 11**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 2 | 4 | 3 | 2 | 1 | 2 | 2 |
| 2 | 2 | 2 | 3 | 1 | 2 | 1 | 1 |
| 1 | 1 | 1 | 2 | 3 | 2 | 1 | 3 |
| 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 |
| 2 | 1 | 2 | 1 | 3 | 2 | 1 | 4 |
| 1 | 3 | 5 | 2 | 3 | 5 | 3 | 2 |
| 1 | 1 | 4 | 1 | 3 | 3 | 1 | 4 |
| 2 | 3 | 2 | 4 | 3 | 2 | 1 | 3 |

Total No. of Settlements = 139
Total No. of unoccupied
sub-square = Nil
Therefore unoccupied area = Nil
Total area of topo sheet = 9x64
576 sq.km

**(C) 54 E 8**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 3 | 6 | 4 | 4 | 7 | 0 |
| 1 | 2 | 3 | 3 | 2 | 4 | 2 | 2 |
| 1 | 3 | 4 | 4 | 3 | 2 | 2 | 3 |
| 3 | 3 | 4 | 3 | 2 | 2 | 5 | 7 |
| 2 | 1 | 2 | 3 | 3 | 3 | 3 | 3 |
| 2 | 3 | 3 | 6 | 3 | 2 | 2 | 1 |
| 2 | 1 | 2 | 2 | 2 | 3 | 2 | 4 |
| 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 |

Total No. of Settlements = 170
Total No. of unoccupied
sub-square = 1
Therefore unoccupied area = 1x9
9 sq.km
Total area of topo sheet = 9x64
576 sq.km

**(D) 54 E 12**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 3 | 5 | 3 | 2 | 3 | 2 | 2 |
| 0 | 3 | 4 | 5 | 3 | 4 | 1 | 2 |
| 3 | 1 | 7 | 3 | 3 | 3 | 3 | 3 |
| 7 | 7 | 3 | 2 | 3 | 3 | 1 | 3 |
| 4 | 1 | 3 | 3 | 1 | 4 | 1 | 1 |
| 3 | 2 | 3 | 2 | 2 | 3 | 2 | 1 |
| 2 | 1 | 3 | 1 | 1 | 2 | 2 | 2 |
| 3 | 1 | 2 | 1 | 1 | 1 | 1 | 1 |

Total No. of Settlements = 159
Total No. of unoccupied sub-square = 1
Therefore unoccupied area = 1x9
9 sq.km
Total area of topo sheet = 9x64
576 sq.km

From table 4-11 it may be seen that part B has no sub-square without settlements and none with six or seven settlements. This indicates greater uniformity of distribution of settlements. Part A and C both have 2 sub-squares with six settlements and one sub-square with seven settlements each. Part D has three sub-squares with seven settlements. Thus, A, C, and D have some patches of concentration.

Similarly, the sub-squares with five settlements though found in each part but their number is not large. Though the sub-squares with 4 settlements are larger in number, yet they are less in number than the sub-squares with 1 to 3 settlements. It means that the largest area is occupied by smaller patches of 1 to 3 settlements tending to scattering part A in the north-west has the smallest area, 69%, and part D has the largest area 86% under such a category while the parts B and C have 79 per cent under this category.

**Table 4-11**

| **Class (No.of Settle-ments)in a square** | **Number of settlements and frequency of squares** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **A** | | **B** | | **C** | | **D** | |
| 0 | 5 | | 0 | | 2 | | 2 | |
| 1 | 23 | | 30 | | 14 | | 28 | |
| 2 | 30 | 69% | 38 | 79% | 37 | 79% | 24 | 86% |
| 3 | 16 | | 21 | | 28 | | 34 | |
| 4 | 16 | | 5 | | 11 | | 6 | |
| 5 | 6 | | 2 | | 2 | | 3 | |
| 6 | 2 | | 0 | | 3 | | 0 | |
| 7 | 2 | | 0 | | 3 | | 3 | |
| | 100 | | 100 | | 100 | | 100 | |

Concentrated distribution pattern of settlements leaves some area without settlements. The table 4-11 also brings out that 4.7%, 0%, 1.6% and 1.6% area of parts A, B, C and D respectively are unoccupied. Since the largest area of the environs is unoccupied, so naturally it should have greater concentration that the other parts. With the help of index of concentration or C we may examine the degree of concentration in the four parts of the region.

It must be taken into account that the total number of settlements on one hand and the total unoccupied area on the other are the determining factors of concentration. This may be expressed as:

$$C = \frac{Ns + Au}{At}$$

where C is the degree of concentration, Ns is the total number of settlements, Au is the area unoccupied and At is the total area of the topo sheet.

Substituting the values in the four different parts A, B, C and D, we get

(A) N.W. environs,

$$C = \frac{158 + 27}{576} \times 100 = 32.11$$

(B) N.E. environs,

$$C = \frac{139 + 0}{576} \times 100 = 24.13$$

(C) S.W. environs,

$$C = \frac{170 + 9}{576} \times 100 = 31.07$$

(D) S.E. environs,

$$D = \frac{159 + 9}{576} \times 100 = 29.16$$

The degree of concentration of the four topographical maps combined is 29.07 as is clear from the following formula :
Degree of concentration of the whole environs -

$$C = \frac{628 + 45}{2304} \times 100 = 29.07$$

This shows that parts A and C have slightly higher concentration than the average of the whole area, while part B is slightly lower than the average of the whole area.

Let us try to analyse the area zonewise. Concentration pattern of settlements is measured in different zones and the results are :

(A) Zone (First 6 km from Bharatpur city)

$$C = \frac{28 + 16.2}{113.1} \times 100 = 39.08$$

(B) Zone (Second 6 km)

$$C = \frac{136 + 0}{339.4} \times 100 = 40.07$$

(C) Zone (Third 6 km)

$$C = \frac{172 + 0}{565.7} \times 100 = 30.4$$

(D) Zone (Fourth km )

$$C = \frac{201 + 22.5}{792.0} \times 100 = 28.2$$

The whole environs

$$C = \frac{537 + 38.7}{1810.2} \times 100 = 31.8$$

By this method also, it is indicated that the second zone has a higher concentration of settlements than the first zone. It is because a large part of the second zone is occupied by Ghana lake.

### Nearest Neighbour Technique

This analysis originally was developed by plant ecologists Clark and Evans in 1954. It is an effective device for quantifying the distribution of any kind of attributes which are located as points on the map. Under this technique, the study has been done at three levels of (1) zonewise distribution of settlements, (2) Classwise distribution of settlements within the zone and (3) Settlement distribution in the region as a whole.

### Zonewise Distribution of Settlements

From the appendix 3-C, it is clear that the first three zones show a uniform distribution and the fourth one shows random, but the departure is from random to uniform. Though there are variations within the zones as is indicated by the 'R' value which varies from

NEAREST NEIGHBOUR DISTANCE, 1971
(ZONEWISE)

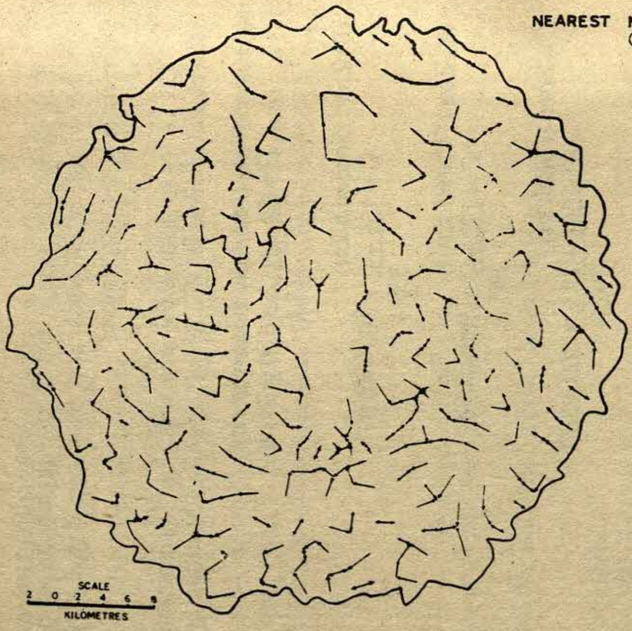

*Fig.* 4-11 Nearest neighbour distance, all types of settlements

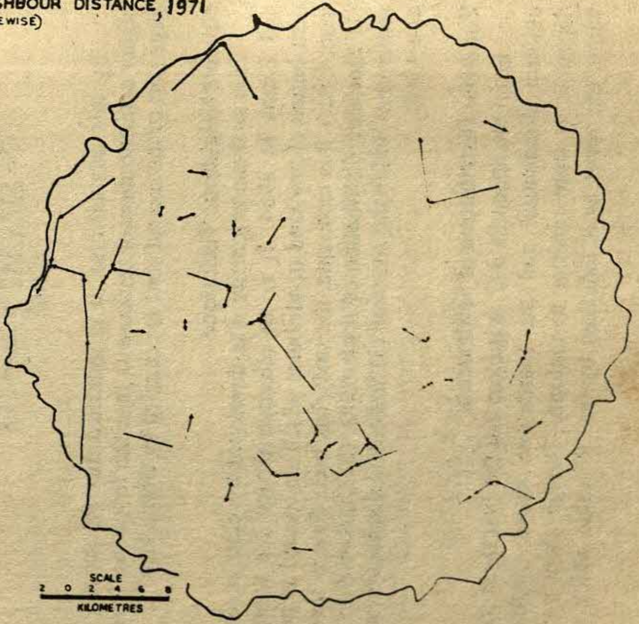

*Fig.* 4-12 Nearest neighbour distance, settlements less than 200 population

NEAREST NEIGHBOUR DISTANCE
(ZONEWISE)

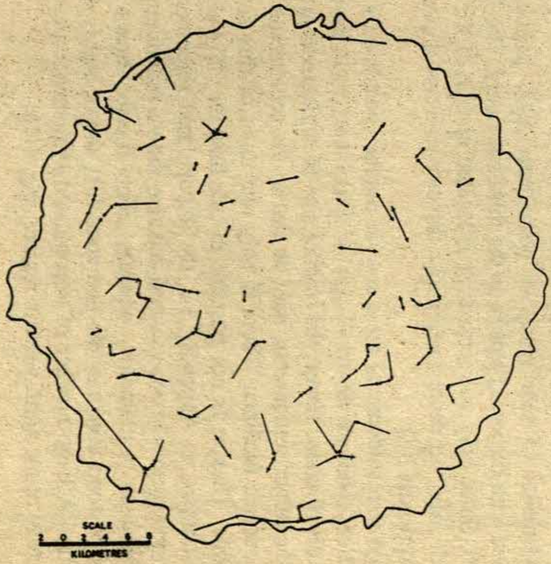

*Fig.* 4-13 Nearest neighbour distance, settlements with 200-500 population

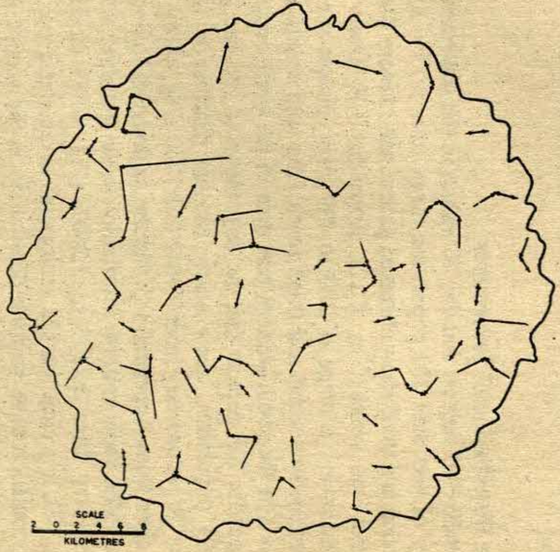

*Fig.* 4-14 Nearest neighbour distance, settlements with 500-1000 population

1.1752 in the fourth zone to 1.3205 in second zone. The figure 3-11 depicts that all the four zones show a uniform distribution of the settlements.

## Classwise Distribution of Settlements

Appendix 3-D depicts that the 'R' values in the settlements of the size group of less than 200 population range from 0.7356 to 1.2057. Zones second and third show clustered pattern and random distribution in the other two zones (Fig. 4-12). Appendix 3-E shows that the settlements having a range of 200 to 499 show almost the random distribution in the second and third zones. The settlements are more concentrated in the south-western part than in the north-eastern. (Fig. 4-13) Appendix 3-F depicts that the settlements in the size group of 500 to 999 population, show nearly random distribution in all the zones. The 'R' values vary from 0.9642 to 1.1700. (Fig. 4-14)

It is clear from Appendix 3-G that the settlements having a range of 1000 to 1999, show uniform distribution in the last three zones. The 'R' values vary from 1.1675 to 2.2607. (Fig. 4-15) According to Appendix 3-H, it is clear that the settlements in the size group of 2000 to 4999 population have uniform distribution in the second and third zones but the first zone shows highly dispersed distribution of settlements. The 'R' values vary from 1.2896 to 2.3255. (Fig. 4-16) The settlements of size group of more than 5000 population are distributed with dispersed pattern in the third zone only. The 'R' value is 2.0070. Since only one settlement is located in each of the first and the fourth zone, no nearest neighbour distance exercise is possible for them. (Appendix 3-I)

Large size settlements are a few in number and have a uniform distrubution, whereas the small size of settlements have random and uniform distribution. Hence, the smaller size of settlements are located around the larger settlements, may be due to the settlements with the socio-economic facilities. There is only one town of this size in the fourth zone. Thus, it is not possible to calculate the 'R' value in the zone. According to Appendix 3-J, the unpopulated settlements show the clustered pattern in zone second and also show a maximum number of unpopulated settlements, whereas zone fourth shows uniform distribution, zone third random and zone first shows highly dispersed distribution. A large number of unpopulated settlements are observed in the middle of the north-western region. (Fig. 4-16)

NEAREST NEIGHBOUR DISTANCE
(ZONEWISE)

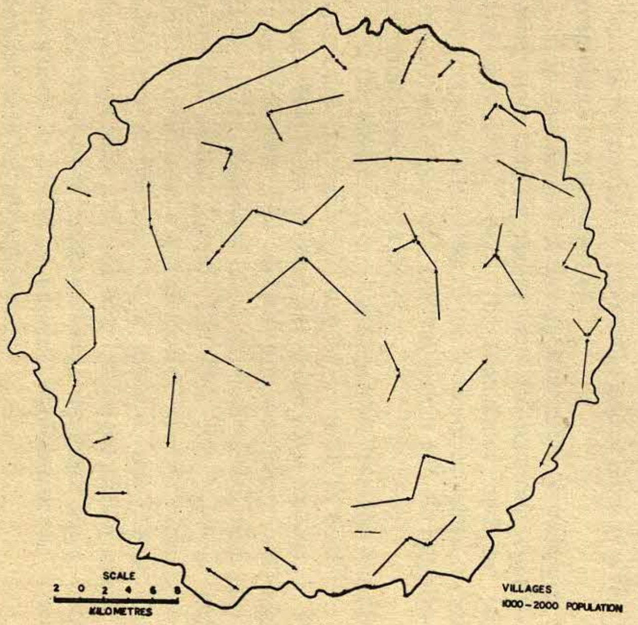

*Fig.* 4-15 Nearest neighbour distance, settlements with 1000-2000 population

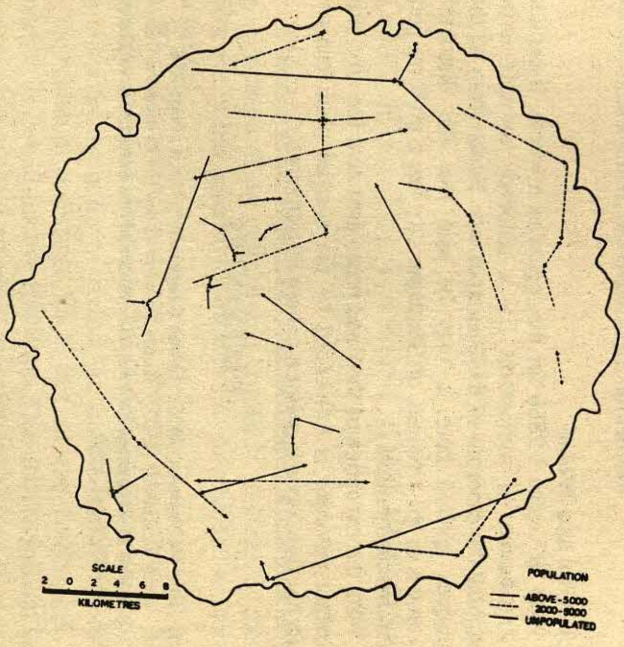

*Fig.* 4-16 Nearest neighbour distance, settlements with 2000-5000 population

### The Region as a Whole

With 'R' value 1.2888 for the region as a whole, it explains that the distribution of settlements has a tendency towards uniformity throughout the environs of the Bharatpur city. Hence from all the three techniques applied here, it may be said that the distribution of settlements in the environs of Bharatpur city has a uniform pattern of settlement distribution.

With the exception of the flood prone area near the city, the entire Bharatpur environs is influenced by the alluvial plain characteristic which has developed a uniform pattern of settlements.

## REFERENCES

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2. **John E. Rickert (1967) "House Facades of the North-eastern United States; A tool of Geographical Analysis, Annals of the Association of Geographers, Vol-57, P-211, 1967.**

## 5

# COMMERCIAL LANDSCAPE AND RETAIL DISTRIBUTION

Markets are the significant dynamic elements in which are inherent the expression of the cultural and economic structure of the cultural landscape. It has internal geography of its own termed as 'commercial landscape'.

The commercial landscape is the part of our daily life. It is landscape not normally designed for beauty, charm or aesthetic appeal, but rather for the utility of exchanging the commodities by the people of the cultural landscape. Each part of the commercial activity produces its own distinctive landscape. Thus the commercial landscape means a piece of the commercial area that can be seen at once and it is always understood that this piece will have a certain artistic sunity or in other words a portion of commercial land or territory which the eye can comprehend in a single view[1].

It is thus defined as any agglomeration of traders on public land having more than ten trading units and occurring regularly on one or more days of the week[2]. The commercial landscape presents very strong contrasts that relate to the levels of economic organization, the technological aspect of a cultural system and the intrinsic features of the culture systems themselves.

At the village and small market-town level the volume of person-to-person barter exchange may be so small as hardly to promote a spatial unit[3]. In urban situations in the older settlements many of the transactions still may involve person-to-person exchange, but the market place becomes more institutionalized and occupies more significant spatial pattern. The high rise buildings and religious buildings constituted a special facet of the commercial landscape in the walled city of Bharatpur. It is apparent that Ganga Mandir, Jama Masjid and Laxman Mandir have created the market centres.

All the market centres and even the lesser shops, where business transactions are carried on, on retail, wholesale or retail-cum-wholesale basis are included under this study.

For the study of commercial landscape of Bharatpur city a detailed questionnaire was prepared in order to get full information about type and size of the shops, number of storeys, age structures, articles sold, self or rented, ownership or partnership and location, etc. The questionnaire had 22 questions to be filled up by the individual enquiries. The author has personally surveyed about 2197 shops. A proforma of the questionnaire is being attached at the end of the text.

The following sequential order has been laid down for making the systematic study of the retail and wholesale tradings.

1. Evoluation of shopping centres.
2. Types of shops (according to original ownership.
3. Physical structure of shopping centres.
4. Retail and wholesale tradings. and
5. Spatial affinities in the retail sites.

**Evolution of Shopping Centres.**

The evolution of commercial landscape of Bharatpur city has an intimate relationship with the growth of its population. In the early days, the settlement grew only within the walled city. So the earliest shopping centre, Chauburja was developed at a distance of about 100 metres from the southern gate of the fort in the period of 1850 to 1975. Two important buildings, Ganga mandir and Jama masjid the foundation of both were laid by Balwant Singh in 1845. After a period of 30 years the shops were constructed around these buildings and small market centres developed after the building's name as Ganga Mandir shopping centre and Jama Masjid shopping centre. And therefore the four market centres developed from 1875 to 1900, Ganga Mandir just south-west of the Chauburja with 150 shops, Jama Masjid shopping centre with 60 shops at a distance of 200 metres in the same direction, Loha Bazar towards the south-west of Ganga mandir with 70 shops and another shopping centre 100 metres long developed with 58 shops, joining the Jama Masjid shopping centre. It is now known as Purana Post Office shopping centre after the name of City Post Office, on the main road.

By the 19th century, the population of the walled city rose high so as to meet with the growing demands of shopping centres, the commercial landscape extended towards the west and east. From Chauburja Market, another market centre is proceeding to the east for nearly 250 metres for 92 shops. It is called the Hospital Road after the name of general hospital on the main road. The Hospital Road further extended 250 metres upto the Mathura gate to accommodate 69 shops named Inner Mathura Gate shopping centre. Sarafa Bazar runs south-west from the Purana Post Office shopping centre to about 150 metres for 77 shops named after the major trade of jewellery. To the south-west of Sarafa Bazar another market centre developed in the shops of Laxman mandir, a famous temple on the road in the core of city. Laxman Mandir shopping centre has 102 shops of different varieties. It shows that the temples have developed roads all round them and there are shops on either sides of the roads. On the side of the temples the shops belong to the temples as they have been carved out in its property. Thus the revenue out of these shops goes to the maintenance of the temples. But at present their rent is nominal and even that much is not realised as the matter is under litigation. Proceeding nearly 200 metres from the Laxman Mandir shopping centre further west there is the Bajaja Bazar specialised in textiles. Bajaja Bazar further extends to the west for nearly 150 metres with 60 shops named as Kotwali Shopping centre after the name of Kotwali which developed after 1925.

*4.1 A view of purana post office shopping centre after rainfall.*

Inner Kumher Gate shopping centre developed towards the left of the Kotwali Shopping Centre for nearly 500 metres with 168 shops running upto Kumher gate. It developed after 1930.

Within the walled city the main shopping centres developed from Mathura gate to Kumher gate till 1930. But the population of the walled city rose high and settlements spread on all the fronts from the core as to meet the growing demands of shopping centres. Business centres grew even in the small zig-ziag and narrow streets and lanes, as a very narrow street runs from Laxman mandir named Dahi Wali Gali after the name of first curd shop and Baasan Gate shopping centre developed on the road which runs from kotwali to the Goverdhan gate for nearly 200 metres with 121 shops and named after the shop of utensils (Baasan in local language). These market centres were developed upto 1950. Outside the city wall, a main mandi yard was built in 1946 at a distance of two km towards the north from the fort. Previously it was purely a forested area and now it has been converted into a big grain mandi. It was the first business centre outside the city wall.

When in 1860 the Bharatpur railways were built by the Maharaja Jaswant Singh, a three km. long unmetalled road was constructed from the station to Gowerdhan gate where mostly the low caste people had their huts on both sides of the road. Now it is known as the Station Road. The shops, however developed on this road according to three phases; The New Mandi Shopping Centre, a length of about 300 metres with 65 shops near the Main Mandi-Yard came into existence in 1951. There, some shops developed near the railway station after 1955 for the industrial labourers. In the third phase they developed Bazaria, a small shopping centre in 1960 on the station road. It is about 150 metres in length with 31 shops and joins the gap between New Mandi Shopping Centre and Station Road shopping centre.

The development of shopping centres in the city wall between 1951 and 1960 is on the road running from the Ganga mandir to Laxman mandir through the Atal band gate. It is residential-cum-shopping centre area. Budh-Ki-Haat for 45 shops mainly as parchuni and tailoring runs south from the southern-west corner of Ganga mandir to about 100 metres. Atal Bund Mandi, a mandi of grain, sugar and kirana runs from Atal bund circle with 118 shops to Atal bund gate at a length of about 200 metres is residential area between Buddha Ki Haat and Atal bund circle which has been converted into a shopping centre because of a great problem of the shops in the main markets.

After 1960, Inner Mathura Gate shopping centre comes out of the Mathura gate and that is known as Outer Mathura Gate shopping centre. It has a length of about 300 metres and meets the national highway to Jaipur. There are 140 shops of different varieties and well developed by the 1970. Inner Kumher Gate shopping centre came out of the Kumher gate in 1965 and that is 200 metres long for nearly 84 shops. A new shopping centre developed on the exhibition road which runs from Outer Kumher Gate shopping centre to the exhibition ground. It is 350 metres long with 126 shops. Both the Exhibition Road and the Outer Kumher Gate shopping centres are important for transport companies, and auto-repairing. A large number of shops of auto-parts and machines owned by refugees have come up on this road. A few show rooms of machineries and fertilizers have also come up.

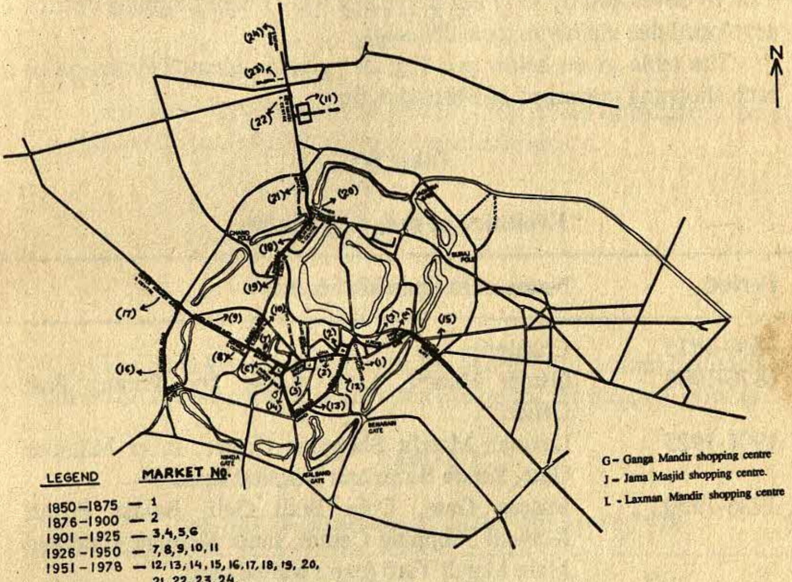

*Fig.* 5-1 Evolution of market centres—Bharatpur city

Delhi Gate shopping centre with 12 shops near Delhi gate (1973), Pahi Bagh shopping centre with 17 shops near Gandhi park (1974) and Inner Goverdhan Gate shopping centre with 10 shops (1976) developed within the walled city and Outer Goverdhan Gate shopping centre with 8 shops developed by 1977 out of the city wall. These shopping centres developed due mainly to local demands.

The table given below and Fig. 5-1 give an idea of evolution of each shopping landscape of Bharatpur city.

**Table 5-1**

**Evolution of shopping centres**

| Period | Name of the market centres |
|---|---|
| 1850-1875 | Chauburja |
| 1876-1900 | Ganga Mandir, Loha Bazar, and Purana Post Office. |
| 1901-1925 | Laxman Mandir Shopping Centre, Inner Mathura Gate, Sarafa Bazar and Hospital Road. |
| 1926-1950 | Baasan Gate, Dahi Wali Gali, Bajaja Bazar, Kotwali Shopping Centre, Inner Kumhar Gate and Main Mandi Yard (extra walled city). |
| 1951-1978 | Station Road, Bajeria, New Mandi Shopping Centre, Outer Mathura Gate, Outer Kumher Gate, Exhibition Road, Malahe, Delhi Gate Shopping Centre, Pahibagh, Inner Goverdhan Gate, Outer Goverdhan Gate, Buddha Ki Haat, Atal Bund Mandi, Jama Masjid Shopping centre and Purani Sabji Mandi. |

## Physical Structure of Shopping Centres

The evolution of the commercial landscape in Bharatpur city on the whole shows that during the fist 212 years of the origin of the city from 1733 to 1945, the markets had been developing only within the walled city. After 1945, it only extended outside the walled city in areas where there were no market centres earlier. First of all Main Mandi Yard (Grain Mandi) was formed out of the walled city near railway station in 1946. Some of the markets were established with the development of the new developing residential colonies. Their physical structure has been studied in the following sequential order:

(a) Age structure,
(b) Floor structure, and
(c) Kachcha-pucca structures.

### (a) **Age structure**

To study the age structure of the commercial landscapes, the city could be divided into the following five periods:

1733 - 1800
1801 - 1850
1851 - 1900
1901 - 1950
1951 - 1978

The table given below shows the number of commercial buildings based on age structure and their percentage for the different periods.

**Table 5-2**

**Number of shops based on age structure,1978**

| **Area** | **1733 to 1800** | **1801 to 1850** | **1851 to 1900** | **1901 to 1950** | **1951 to 1978** | **Total** |
|---|---|---|---|---|---|---|
| Walled city | 74 | 358 | 475 | 333 | 267 | 1507 |
| Extra walled city | 11 | 5 | 94 | 135 | 377 | 622 |
| **Total** | 85 | 363 | 569 | 468 | 644 | 2129 |
| **Per cent** | 0.99 | 17.05 | 26.74 | 21.98 | 30.24 | 100 |

Source: Personal survey 1978

The table shows an increasing growth of shops with the passage of time. Only 85 shops were built in the first 67 years and 363 were added in the next 50 years. During the period from 1851 to 1900, 569 shops were added more. The largest number of 644 shops was added in 28 years from 1951 to 1978.

It is noted that during the first 67 years the construction of 74 shops was confined to the walled city and of 11 to the extra walled city. These 85 shops were constructed after 30 years of the building of the fort. From 1801 to 1850, 358 shops were built in the walled city while only 5 outside the city wall. From 1851 to 1950 the number of the shops increased both in the walled and extra walled city. But in the last 28 years from 1951 to 1978, 267 shops were built in the walled city while 377 out-side. This larger development in the extra walled city was due to the development of residential colonies out of the Mathura gate to provide the population neighbourhood facilities. The evolution of the city shows that it has continuously grown and expanded. This expansion was slow in the beginning but vigorous in the latter times.

*4.2 Old residential houses converted into shops at hospitals road.*

The first 85 shops are almost as old as the city and are the property of royal houses. These are generally double storeyed and stand on the main roads forming the main markets. Originally these 85 shops were residential houses built in the form that there could be converted into shops within a period of 67 years.

The markets very near the fort are very old. In the Chauburja shopping centre 12 shops were constructed along with the fort. After 1750, 16 shops were constructed in the Bajaja Bazar. Thus from 1733 to 1800 a total of 74 shops was constructed within the walled city from Kumher gate to Mathura gate and 11 shops outside the city wall mainly out of the Mathura gate. In the first half of the 19th century a total of 358 shops came up in the different market centres mainly from Kumher gate to Mathura gate. The largest number of shops was developed in Laxman Mandir shopping centre. (Table 5-3) During this period the development of the shops started sprawling into the lanes and alleys. For example 16 shops came up in the Dahi Wali Gali, a very narrow street runs towards the north from Laxman mandir, 11 shops in Baasan Gate, 32 shops at Mathura Gate, 17 shops at Buddha Ki Haat and 23 shops in Atal Bund Mandi. The development of 5 shops out of the Mathura gate was nominal in this period.

**Table 5-3**

**Number of shops based on age structure, 1978 (Walled city)**

| **Name of the market centre** | **1733 to 1800** | **1801 to 1850** | **1851 to 1900** | **1901 to 1950** | **1951 to 1978** | **Total** |
|---|---|---|---|---|---|---|
| 1. Inner Kumher Gate | 9 | 17 | 28 | 54 | 28 | 166 |
| 2. Kotwali Shopping Cen. | 6 | 25 | 25 | 2 | - | 58 |
| 3. Bajaja Bazar | 16 | 41 | 62 | 19 | 3 | 141 |
| 4. Laxman Mandir | - | 42 | 5 | 29 | 6 | 82 |
| 5. Dahi Wali Gali | - | 16 | 17 | 5 | 10 | 48 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6. Sarafa Bazar | 7 | 17 | 37 | 13 | - | 74 |
| 7. Purana Post Office | 9 | 20 | 34 | 5 | 4 | 72 |
| 8. Jama Masjid Shopping Centre | - | 21 | 4 | 31 | 2 | 58 |
| 9. Loha Bazar | 6 | 10 | 17 | 23 | 11 | 67 |
| 10. Ganga Mandir Shopping Centre | 6 | 28 | 102 | 6 | 16 | 158 |
| 11. Chauburja | 12 | 14 | 26 | 8 | 7 | 67 |
| 12. Hospital Road | 1 | 24 | 33 | 15 | 16 | 89 |
| 13. Mathura Road | 2 | 32 | 17 | 16 | 2 | 69 |
| 14. Atal Band Mandi | - | 23 | 36 | 40 | 15 | 114 |
| 15. Baasan Gate | - | 11 | 25 | 37 | 48 | 121 |
| 16. Pahi Bagh Shopping Centre | - | - | 7 | 11 | 1 | 19 |
| 17. Buddha Ki Haat | - | 17 | - | 18 | 10 | 45 |
| 18. Delhi Gate Shopping Centre | - | - | - | - | 11 | 11 |
| 19. Purani Sabji Mandi | - | - | - | - | 38 | 38 |
| 20. Inner Goverdhan Gate | - | - | - | - | 9 | 9 |
| Total | 74 | 358 | 475 | 333 | 267 | 1507 |

Source : Personal Survey 1978

## Table 5-4

### Number of the shops based on age structure,1978 (Extra walled city)

| Name of the market centre | 1733 to 1800 | 1801 to 1850 | 1851 to 1900 | 1901 to 1950 | 1951 to 1978 | Total |
|---|---|---|---|---|---|---|
| 1. Station Road | - | - | 22 | 23 | 44 | 89 |
| 2. Bajeria | - | - | - | 5 | 19 | 24 |
| 3. New Mandi Shopping Centre | - | - | - | 25 | 52 | 77 |
| 4. Outer Mathura Gate | 11 | 5 | 72 | 20 | 29 | 137 |
| 5. Outer Kumher Gate | - | - | - | 11 | 77 | 88 |
| 6. Exhibition Road | - | - | - | 11 | 112 | 123 |
| 7. Outer Goverdhan Gate | - | - | - |  | 11 | 11 |
| 8. New Mandi Yard | - | - | - | 40 | 23 | 63 |
| 9. Malahe | - | - | - | - | 10 | 10 |
| Total | 11 | 5 | 94 | 135 | 377 | 622 |

Source : Personal Survey, 1978

In 100 years from 1851, the development of 808 shops took place almost in all the main market centres within the walled city; out of these 108 shops grew in Ganga Mandir Shopping centre. It was all due to the extension of the Ganga Mandir and Laxman Mandir shopping centres.

In the Inner Kumher Gate 82 shops, in the Bajaja Bazar 81 shops specialised in textiles, in the Sarafa Bazar 50 shops specialised in jewellery and in the Atal Bund Mandi 76 shops specialised in grains and kiranas developed upto 1950. It should not surprise that till 1950 there were some vacant lands in the commercial area of the walled city where 267 shops were built after independence, 58 of these were built in the Inner Kumher Gate, 48 in the Baasan gate and 38 shops in the Purani Sabji Mandi. (Table 5-3) However, this number of additional shops is smaller than the number of shops built outside the walled city during the same period.

As the population increased residential dwellings developed outside the Goverdhan gate, Mathura gate and Kumher gate. Hence the total 377 shops developed in all the market centres in the extra walled city to cater the needs of the local settlers. The commercial landscapes outside the city wall developed only after the independence. (Table 5-4)

**(b) Floor structure**

To study the floor structure, the commercial establishments have been divided into three groups:

1. Single storeyed,
2. Double storeyed and
3. Triple storeyed.

**Table 5-5**

**Comparative statement of floor structures within and outside the walled city, 1978**

| Area | Single storeyed | Double storeyed | Triple storeyed | Total |
|---|---|---|---|---|
| Walled city | 872 | 618 | 17 | 1507 |
| Extra walled city | 430 | 154 | 38 | 622 |
| Total | 1,302 | 772 | 55 | 2,129 |
| Per cent | 61.15 | 36.27 | 2.58 | 100 |

Source: Personal survey, 1978

## Table 5-6

### Number of shops based on floor structure, 1978 (walled city)

| S. No. | Name of the Market | Number of storeyed Single | Double | Triple | Total |
|---|---|---|---|---|---|
| 1. | Inner Kumher Gate | 74 | 90 | 2 | 166 |
| 2. | Kotwali Shop Cent. | 10 | 48 | - | 58 |
| 3. | Bajaja Bazar | 75 | 66 | - | 141 |
| 4. | Laxman Mandir | 62 | 20 | - | 82 |
| 5. | Dahi Wali Gali | - | 48 | - | 48 |
| 6. | Sarafa Bazar | 31 | 43 | - | 74 |
| 7. | Purana Post Office | 42 | 30 | - | 72 |
| 8. | Jama Masjid Shopping Centre | 30 | 20 | - | 50 |
| 9. | Loha Bazar | 50 | 17 | - | 67 |
| 10. | Ganga Mandir Shopping Centre | 128 | 30 | - | 158 |
| 11. | Chauburja | 54 | 13 | - | 67 |
| 12. | Hospital Road | 50 | 39 | - | 89 |
| 13. | Mathura Gate | 43 | 26 | - | 69 |
| 14. | Atal Bund Mandi | 71 | 42 | 1 | 114 |
| 15. | Baasan Gate | 63 | 46 | 12 | 121 |
| 16. | Pahi Bagh Shopping Centre | 10 | 9 | - | 19 |
| 17. | Buddha Ki Haat | 12 | 31 | 2 | 45 |
| 18. | Delhi Gate Shopping Centre | 11 | - | - | 11 |
| 19. | Purani Sabji Mandi | 38 | - | - | 38 |
| 20. | Inner Goverdhan Gate | 9 | - | - | 9 |
|  | Total | 872 | 618 | 17 | 1,507 |

Source: Personal survey, 1978.

Out of a total number of 2,129 shops 1, 302 are single storeyed, 772 double storeyed and only 55 triple storeyed. Single storeyed structure is the main feature in the commercial landscape of the city which forms 61.15 per cent of the total shops. (Table 5-5)

In the walled city out of a total number of 1507 shops 872 are single storeyed, 618 double storeyed and only 17 triple storeyed. Almost all the shops of Jama Masjid, Ganga Mandir and Laxman Mandir are single storeyed structures. In Dahi Wali Gali being an old residential area, none of the structure is less than two or three storeyed structure. Delhi Gate, Purani Sabji Mandi and Inner Kumher Gate shopping centres have only single storeyed structures. In the rest of the market centres single and double storeyed commercial establishments is equidistributed. The largest number of 128 single storeyed shops is confined in the Ganga Mandir Shopping Centre. There are only 17 triple storeyed commercial establishments with maximum of 12 in Baasan Gate, a residential area of the main road which is slowly converting the ground floors into the commercial establishments.

There are 9 shopping centres in the extra walled city with 622 commercial establishments of one to three storeyed structures.

The largest number of 123 single storeyed shops is on the Exhibition Road, a newly developed market. Mathura Gate has 89 single storeyed shops. The largest number of 43 double storeyed structures is in the New Mandi Yard. (Table 5-7)

Extra walled city has 38 triple storeyed commercial establishments with maximum number of 20 in New Mandi Yard. In this way, there are 5 double storeyed establishments for every 8 single storeyed commercial establishments and one triple storeyed for every 23 single storeyed commercial establishments in the whole of the commercial landscape of the city.

## (c) Kachcha-Pucca Structures

The shops are classified into Kachcha and Pucca structures according to the material used in their construction. The commercial structures in Bharatpur city are predominantly masonary, built of stones and bricks. The bricks have been mainly used for the last 28 years. Most of the commercial buildings are made of red sandstone; some of these are famous for their architectural style, exquisite engraving of varied floral designs. Out of a total of 2,253 shops in the entire commercial land-

## Table 5-7
## Number of shops based on floor structure, 1978
## (Extra walled city)

| S. No. | Name of the Market | Number of storeyed Single | Double | Triple | Total |
|---|---|---|---|---|---|
| 1. | Station Road | 54 | 26 | 9 | 89 |
| 2. | Bajeria | 17 | 7 | - | 24 |
| 3. | New Mandi Shop Centre | 41 | 36 | - | 77 |
| 4. | Outer Mathura Gate | 89 | 39 | 9 | 137 |
| 5. | Outer Kumher Gate | 85 | 3 | - | 88 |
| 6. | Exhibition Road | 123 | - | - | 123 |
| 7. | Outer Goverdhan Gate | 11 | - | - | 11 |
| 8. | New Mandi Yard | - | 43 | 20 | 63 |
| 9. | Malahe | 10 | - | - | 10 |
| | Total | 430 | 154 | 38 | 622 |

Source: Personal survey, 1978

## Table 5-8
## Number of shops based on Kachcha-Pucca structures, 1978

| Name of area | Pucca | Kachcha | Thelas & paddlers | Total |
|---|---|---|---|---|
| Walled city | 1,500 | 7 | 63 | 1570 |
| Extra Walled city | 567 | 55 | 61 | 683 |
| Total | 2,067 | 62 | 124 | 2,253 |
| Percent | 91.74 | 2.75 | 5.51 | 100 |

Source: Personal Survey, 1978.

scape 62 shops are Kachcha 55 of them being outside the city wall.

In the walled city, 4 shops are Kachcha in the Jama Masjid Shopping Centre and 1 shop each in the Inner Kumher Gate, Atal Bund Mandi and Buddha Ki Haat. (Table 5-9)

Kachcha shops mainly of auto-services can be seen out of the Kumher Gate. A few such shops are at the Station Road (2), Bajaria (4), New Mandi shopping Centre (2), Outer Mathura Gate (3), Exhibition Road (8) and Malahe (4). Table 4-10)

Almost all these shops belong to the down trodden community and poor people who have built them on unauthorised land.

The paddlers search out a suitable location for setting themselves. Here the paddlers sell chaat pakore, vegetables, fruits and bidies in the main market centres and infront of the schools and other government offices.

**Table 5-9**
**Number of shops based on Kachcha-Pucca structure (1978)**
**(Walled City)**

| S. No. | Name of the Market | Pucca | Kachcha | Thelas | Total |
|---|---|---|---|---|---|
| 1. | Inner Kumher Gate | 165 | 1 | 2 | 168 |
| 2. | Kotwali Shop. Centre | 58 | - | 2 | 60 |
| 3. | Bajaja Bazar | 141 | - | 6 | 147 |
| 4. | Laxman Mandir | 82 | - | 20 | 102 |
| 5. | Dahi Wali Gali | 48 | - | - | 48 |
| 6. | Sarafa Bazar | 74 | - | 3 | 77 |
| 7. | Purana Post Office | 72 | - | 5 | 77 |
| 8. | Jama Masjid Shopping Centre | 54 | 4 | - | 58 |
| 9. | Loha Bazar | 67 | - | 3 | 70 |
| 10. | Ganga Mandir Shopping Centre | 158 | - | 10 | 168 |
| 11. | Chauburja | 67 | - | 5 | 72 |
| 12. | Hospital Road | 89 | - | 3 | 92 |
| 13. | Mathura Gate | 69 | - | - | 69 |

| | | | | | |
|---|---|---|---|---|---|
| 14. | Atal Bund Mandi | 113 | 1 | 4 | 118 |
| 15. | Baasan Gate | 121 | - | - | 121 |
| 16. | Pahi Bagh | 19 | - | - | 19 |
| 17. | Buddha Ki Haat | 44 | 1 | - | 45 |
| 18. | Delhi Gate Shopping Centre | 11 | - | - | 11 |
| 19. | Purani Sabji Mandi | 38 | - | - | 38 |
| 20. | Inner Goverdhan Gate | 9 | - | - | 9 |
| | Total | 1,500 | 7 | 63 | 1,570 |

Source: Personal Survey, 1978.

### Table 5-10
### Number of shops based on Kachcha-Pucca structure (1978) (Extra Walled City)

| S. No. | Name of the Market | Pucca | Kachcha | Thelas | Total |
|---|---|---|---|---|---|
| 1. | Station Road | 87 | 2 | 30 | 119 |
| 2. | Bajeria | 20 | 4 | 10 | 34 |
| 3. | New Mandi Shopping Centre | 75 | 2 | 1 | 78 |
| 4. | Outer Mathura Gate | 134 | 3 | 15 | 152 |
| 5. | Outer Kumher Gate | 56 | 32 | - | 88 |
| 6. | Exhibition Road | 115 | 8 | 2 | 125 |
| 7. | Outer Goverdhan Gate | 11 | - | - | 11 |
| 8. | New Mandi Yard | 63 | - | 3 | 66 |
| 9. | Malahe | 6 | 4 | - | 10 |
| | 567 | 55 | 61 | 683 | |

Source: Personal Survey, 1978.

There are 124 paddlers in the city or 6 paddlers per hundred shops. In the walled city, the largest number of paddlers (20) is seen at Laxman Mandir due to the core of the city. Only a few (10) at Ganga Mandir, Bajaja Bazar (6), Purana Post Office (5), Chauburja (5) and two or three in the different market centres.

There are 61 paddlers in the extra walled city with the largest number of 30 paddlers is seen at the Station Road.

## Frontage

The average frontage of the shops in the city is about 8 feet. In New Mandi Yard (63 shops) on an average there is frontage of 30 feet. However, the largest frontage of the shops in Bharatpur is to be seen at New Mandi Yard outside the city wall as the wholesale grain business needs large space. The shortest frontage (6 feet) is in Bajaja Bazar due mainly to the division of the shops.

## Spatial Location of Work Centres

The spatial location of the work centres and the houses of the shopkeepers are also the important factors for the study of the commercial landscape. A large number of shopkeepers have their residences at a distance of 50 to 100 metres from the shops. The others reside in the mohallas behind the shops, in new colonies and in neighbouring villages and in a few cases the shopkeepers live on the first floor of the shops. Outside the city wall, in New Mandi yard all the shopkeepers are using the first floors for residential purposes. In this way they neither spend time nor money on travelling.

In some areas the front portions of the residences at the ground floor have been used for commercial purposes and therefore the shopkeepers live either in the backside of the shops or on the first floors. Such areas are Baasan Gate Shopping Centre, Atal Bund Mandi and Buddha Ki Haat.

In the extra walled city, the new commercial centres such as Outer Kumheer Gate and Exhibition Road where 95 per cent of the shopkeepers have their residences within the walled city on an average travel 500 to 1000 metres and the rest either reside inside the shops or come from the neighbouring villages.

## Nature of the Trade

The nature of the trade may be wholesale, retail and wholesale-cum-retail. Thus the shops may be divided into three categories:

(1) Retail shops, (2) Wholesale shops and (3) Retail-cum-wholesale shops. In a way, retail and wholesale tradings are symbiotic in market centre. Their co-existence is essential for the customer and the shopkeeper alike. This is why in Bharatpur as in any other Indian city the retail areas are located adjacent to the wholesale areas. Both types of trading go on inside the city wall as well as outside. Out of 2,022 shops, 100 or only 4.9 per cent are of wholesale trade, i.e. for every 20 retail shops there is on an average one wholesale shop. However, the number of wholesale establishments within the city wall is about half of the number outside the city wall as is noted in the table:

**Table 5-11**

**Number of shops based on retail and wholesale trading, 1978.**

| S. No. | Name of area | Retail | Retail and wholesale | Whole-sale | Total |
|---|---|---|---|---|---|
| 1. | Walled city | 1,398 | 21 | 37 | 1,456 |
| 2. | Outer walled city | 501 | 2 | 63 | 566 |
| | Total | 1,899 | 23 | 100 | 2,022 |
| | Percent | 93.9 | 1.2 | 4.9 | 100 |

Source: Personal Survey, 1978.

Generally the wholesale trading is found in the specialised markets. There are 11 cloth shops in Bajaja Bazar, 8 vegetable shops in Jama Masjid Shopping Centre and 15 grain shops in Atal Bund Mandi of wholesale trading. Similarly outside the city wall, all the 63 shops of New Mandi Yard deal in wholesale trading. Wholesale-cum-retail trading contributes nearly one per cent of the total commercial establishments. The remaining part of the commercial landscape is studied with purely retail trade. Retailing of various articles is not only scatterd throughout the commercial landscape but is also found in the neighbourhoods of newly developing colonies for the daily requirements of the people living there. The detailed description of number of shops based on retail and wholesale trading is given in tables 5-12 and 5-13.

## Table 5-12

**Number of shops based on retail and wholesale trading, within the walled city, 1978.**

| S. No. | Name of area | Retail | Retail and wholesale | Whole-sale | Total |
|---|---|---|---|---|---|
| 1. | Inner Kumher Gate | 161 | - | - | 161 |
| 2. | Kotwali Shopping Centre | 56 | - | - | 56 |
| 3. | Bajaja Bazar | 120 | 9 | 11 | 140 |
| 4. | Laxman Mandir | 69 | 6 | - | 75 |
| 5. | Dahi Wali Gali | 47 | - | - | 47 |
| 6. | Sarafa Bazar | 72 | - | 1 | 73 |
| 7. | Purana Post Office | 70 | - | - | 70 |
| 8. | Jama Masjid Shopping Centre | 40 | 4 | 8 | 52 |
| 9. | Loha Bazar | 64 | 2 | - | 66 |
| 10. | Ganga Mandir Shopping Centre | 155 | - | - | 155 |
| 11. | Chauburja | 67 | - | - | 67 |
| 12. | Hospital Road | 83 | - | - | 83 |
| 13. | Mathura Gate | 66 | - | - | 66 |
| 14. | Atal Band Mandi | 99 | - | 15 | 114 |
| 15. | Baasan Gate | 116 | - | 2 | 118 |
| 16. | Pahi Bagh Shopping Centre | 17 | - | - | 17 |
| 17. | Buddha Ki Haat | 41 | - | - | 41 |
| 18. | Delhi Gate Shopping Centre | 10 | - | - | 10 |
| 19. | Purani Sabji Mandi | 38 | - | - | 38 |
| 20. | Inner Goverdhan Gate | 7 | - | - | 7 |
| | Total | 1,398 | 21 | 37 | 1,456 |

Source : personal survey 1978.

**Table 5-13**

**Number of shops based on retail and wholesale trading, 1978.(Extra Walled City)**

| S. No. | Name of area | Retail and wholesale | Retail | Whole-sale | Total |
|---|---|---|---|---|---|
| 1. | Station Road | 75 | - | - | 74 |
| 2. | Bajaria | 21 | - | - | 21 |
| 3. | New Mandi Shopping Centre | 64 | - | - | 64 |
| 4. | Outer Mathura Gate | 127 | - | - | 127 |
| 5. | Outer Kumher Gate | 84 | - | - | 84 |
| 6. | Exhibition Road | 109 | 2 | - | 111 |
| 7. | Outer Gowerdhan Gate | 11 | - | - | 11 |
| 8. | New Mandi Yard | - | - | 63 | 63 |
| 9. | Malahe | 10 | - | - | 10 |
| | Total | 501 | 2 | 63 | 566 |

Source : Personal Survey, 1978.

**Specialisation**

On the basis of the survey of the city, certain aspects regarding specialisation have come up. In these specialised market centres similar shops of one article are found. Bharatpur city has specialised markets of articles like cloth, jewellery, grain, vegetable, automobile repairs and auto-parts etc.

From the table 5-14, it is clear that specialisation is very significant in some commodities. For example vegetable, cloth, grain, jewellery and automobile repairing are the most clustered types of functions. In the succeeding paragraphs efforts have been made to highlight these aspects of local specialisation.

Mainly the cloth shops localised in Bajaja Bazar. A few cloth shops are also found at Chauburja Shopping Centre and in Inner

Mathura Gate. In Bajaja Bazar 53.6 per cent of the total shops deal in cloth, of which 11 trade on wholesale basis.

**Table 5-14**

**Specialised markets in Bharatpur, 1978.**

| Name of the specialised articles | Name of the specialised markets | Total No. shops | No. of specilised shops | Percentage |
|---|---|---|---|---|
| Cloth | Bajaj Bazar | 140 | 75 | 53.6 |
| Jewellery | Sarafa Bazar | 73 | 32 | 43.9 |
| Grain | New Mandi Yard | 63 | 63 | 100.0 |
| Grain & Kirana | Atal Bank Mandi | 114 | 62 | 54.4 |
| Vegetable | Purani Sabji Mandi | 38 | 28 | 73.7 |
| Vegetable | Jama Masjid Shopping Centre | 52 | 31 | 59.7 |
| Machinery repairing | Outer Kumher Gate | 84 | 16 | 19.0 |
| Machinery | Exhibition Road | 111 | 25 | 20.5 |
| Machinery parts | Exhibition Road | 111 | 23 | 20.8 |
| Goldsmith | Dahi Wali Gali | 47 | 27 | 57.4 |

Source: Personal Survey, December, 1978.

There are two important grain mandies in the city. The location of grain shops in the New Mandi Yard is significant because of its proximity to the railway station and road connections from all sides. Here all the 63 shops carry wholesale trade. Atal Band Mandi is older than New Mandi Yard and has 62 shops or 54.4 per cent of the total shops. It carries both retail and wholesale trade.

There are two vegetable mandies inside the city wall. Purani Sabji Mandi behind the Laxman mandir has 28 vegetable shops or 73.7 per cent of the total shops sell on retail basis. There are 31 vegetable shops in Jama Masjid Shopping Centre carry purely wholesale trade. This area was allowed by the municipality in 1972 due to the shortage of the area in Purani Sabji Mandi.

In the present study jewellery forms one of the important fancy articles at the shopping centre. In Bharatpur city jewellery shops are mainly concentrated in the Sarafa Bazar. Out of a total of 73 shops, 32 are jewellery shops. The vicinity of goldsmiths plays a significant role in the economy of the jewellers, as the two-goldsmiths and jewellers-are complementary to each other. Most of the goldsmiths have been concentrated in Dahi Wali Gali just behind the Sarafa Bazar. Here more than 50 per cent of the total shops are of goldsmiths.

The whole of the commercial landscape developed out of the Kumher gate is well known as a automobile and machinery repairing centre. Here 21 per cent of the total shops are of the automobile repairing. This service centre developed in 1972 due mainly to the existence of Rajasthan roadways and other private bus stands. From this service centre, the national highway 11 passes at a distance of 100 metres towards the south.

Exhibition Road has not only the automobile repairing shops but also machinery parts and mainly for the agricultural equipments.

### Number of Shops and Population

Shopping centres have a positive correlation with the population, its growth and distribution together with the means of transportation, within the region it serves. The calculations for Bharatpur reveal that there is one shop for every 43 persons. Laxman Mandir, Chauburja and Ganga Mandir, the biggest shopping centres lie within the walled city which have very high population density. It is not only the size of the shopping centre which has a direct correlation with the size of the population but even the number of shops of a particular article has a bearing on the size and cultural character of the population. This may be studied from the table.

Taken for the city as a whole the number of shops of grocery articles ranks first. There is one grocery shop for every 117 persons. This is followed by the shops of service articles where 160 persons depend upon one shop. It is clear from the table 5-15 that the grocery article shops predominate the commercial landscape. Among the shops of groceries, perchuni occupies the highest position. It forms the largest bulk being 7.7 per cent of the total shops and each shop serves 563 people.

**Table 5-15**
**Ratio of articles with population, 1978**

| Name of the articles | Number of shops | Percentage of the total shops | No. of persons per one shop |
|---|---|---|---|
| On the basis of 90,000 population, the projected figure of 1978. | | | |
| TOTAL SHOPS | 2022 | 100 | 43 |
| **Food articles** | 770 | 37.14 | 117 |
| Grain | 110 | 5.30 | 811 |
| Kirana | 160 | 7.71 | 563 |
| Sweet | 103 | 4.96 | 874 |
| Restaurant | 66 | 3.18 | 1364 |
| Vegetable | 70 | 3.38 | 1286 |
| Betel and smoking | 65 | 3.13 | 1385 |
| Pansari | 45 | 2.17 | 2000 |
| **Household** | 151 | 7.28 | 638 |
| Iron & hardware | 37 | 1.78 | 2432 |
| Utensils | 21 | 1.01 | 4286 |
| Electrical goods | 18 | 0.86 | 5000 |
| Cycle | 11 | 0.53 | 8182 |
| **Service** | 564 | 27.20 | 160 |
| Tailor | 72 | 3.47 | 1250 |
| Goldsmith | 56 | 2.70 | 1607 |
| Cycle repair | 69 | 3.32 | 1304 |
| Watch repair | 29 | 1.39 | 3103 |
| Machinery repair | 73 | 3.52 | 1232 |
| **Fancy shops** | 395 | 19.05 | 228 |
| Cloth | 183 | 8.82 | 491 |
| General store | 88 | 4.24 | 1022 |
| Shoe | 29 | 1.39 | 3103 |
| Sarafa | 42 | 2.02 | 2142 |
| **Miscellaneous** | 142 | 6.84 | 633 |
| Machinery parts | 55 | 2.65 | 1636 |
| Books | 21 | 1.01 | 4285 |

Source: Personal Survey, 1978.

The number of cloth shops is not only the largest in fancy group but also in all the major groups. It proves that cloth shops not only serve the city dwellers but also cater the needs of the rural enviorns upon which the city survives. The number of shops dealing in books, electrical goods, shoes and utensils are comparatively few. Each of these shop serves between 3,000 and 5,000 people.

Restaurant (3.18 per cent) and cycle repaires (3.32 per cent) are the other two groups of shops which show a higher proportion in the shopping complexes. While the former serves the city dwellers, the rural migrants, the cummuters and the travellers and the latter serves mostly the city dwellers. The shops of tailors form 3.47 per cent and each shop is serving about 1,250 people.

The correlation between population and shopping centres indicates that occupational activities of the second and fifth place (Household article and Miscellaneous) have not fully developed in the city and hence some shops concerning these occupations are likely to grow up.

### Rental and Organisational Structure of Establishments

Data on the various aspects of the establishments were collected and tabulated in the following form for the walled city and extra walled city.

As 74.9 per cent of the total shops were rented, it shows that many landlords do not run their shops themselves but prefer to rent out. The reasons are many and they can be summarised as follows:

1. The total shops of Laxman Mandir, Ganga Mandir and Jama Masjid are on rent.
2. The owner of four to five shops runs only one.
3. Some poor people have now rented the front-portions of their houses for utilising as shops. This practice is clearly seen at Baasan Gate Shopping Centre, Pahi Bagh, Dahi Wali Gali, Atal Bund Mandi and Buddha Ki Haat.
4. In the extra walled city the rich people have constructed the rows of shops and given them on rent.

It may be noted that a total of 107 shops are lying vacant in all the shopping centres of the city. In the walled city, 51 shops are vacant in spite of the heavy demand of shops in the area. On an average one shop is vacant for every 42 shops. The reason can be summarised as given below:

## Table 5-16

### Rental structure and organisation of establishment, 1978

| Area | Self | Rented | Total | Ownership | Partnership | Semi government | Cooperative | Vacant | Total | Employees |
|---|---|---|---|---|---|---|---|---|---|---|
| Walled city | 333 | 1123 | 1456 | 1423 | 32 | - | 1 | 51 | 1507 | 2288 |
| Extra walled city | 174 | 391 | 565 | 532 | 31 | 2 | - | 56 | 621 | 1182 |
| TOTAL | 507 | 1514 | 2021 | 1955 | 63 | 2 | 1 | 107 | 2128 | 3470 |
| Percent | 25.1 | 74.9 | 100 | 91.5 | 3.4 | .09 | .04 | 5.0 | 100 | - |

Source: Personal Survey, 1978.

1. In the walled city, some vacant shops are in delapidated condition and the others are under dispute among the members of the families.
2. In the extra walled city, some vacant shops were newly constructed at the time when the author surveyed the city.

Most of the shops are run by a single person. Due to low margins of profit and small turnover, owners do not employ servants. However, the servants are employed in big business concerns dealing with grain, cloth and other big show rooms. The total number of employees in all the shops of the city is 3,470 which comes to an average of 1.7 persons per shop. The shops of vegetables, fruits and betel are generally run by single persons. (Table 5-17 and Table 5-18)

The common notion of the meaning of land value is its monetary worth-the value of land in the market place[4]. The author classified all the shops of Bharatpur into four sections for the study of rental position.

**1. Shops of Devesthan:** The shops of temples come under the department of devesthan shops, 43 of Laxman mandir, 66 of Ganga mandir and 41 shops belong to different temples. All the shops are on a very nominal rent. The average rent per shop is about rupees 20 and even that much is not realised, as the matter is under litigation.

**2. Shops of Jama Masjid:** There are 45 shops and their rent range correct from 40 to 50 rupees per month.

**3. Shops of Nazool Department:** There were 419 shops under the department by the end of 1967 but 361 shops had been sold to the same tenants. Now it has only 50 shops scattered in the main market centres from Kumher Gate to Mathura Gate. The rent of these shops is hardly from 15 to 20 rupees per month.

**4. Private Shops:** Real rental position and land value in the different market centres is reflected by the private shops. Field survey indicates large disparities in the land values of shops from market to market and site to site.

The author studies the rent position of the shops for the whole commercial landscpe and presented the sector model of commercial land value. High-rent sector moves from its point of origin near the CBD or Central Business District. Laxman mandir forms the CBD of the city. The high-rent sector moves towards east upto Rajasthan road-

## Table 5-17

### Number of shops based on organisation, 1978 (Walled City)

| Name of the market | Self | Rented | Total | Owner ship | Partner ship | Coopera tive | Vacant | Total | Emp- loyees |
|---|---|---|---|---|---|---|---|---|---|
| Inner Kumer Gate | 29 | 132 | 161 | 148 | 12 | - | 6 | 166 | 200 |
| Kotwali Shopping Centre | 16 | 40 | 56 | 54 | 2 | - | 2 | 58 | 120 |
| Bajaja Bazar | 49 | 91 | 140 | 135 | 5 | - | 1 | 141 | 280 |
| Laxman Mandir | 9 | 66 | 75 | 72 | 3 | - | 7 | 82 | 140 |
| Dhai Wali Gali | 4 | 43 | 47 | 45 | 2 | - | 1 | 48 | 90 |
| Sarafa Bazar | 40 | 33 | 73 | 73 | - | - | 1 | 74 | 130 |
| Purana Post Office | 6 | 64 | 70 | 67 | 2 | 1 | 2 | 72 | 120 |
| Jama Masjid Shopping Cent. | 2 | 50 | 52 | 52 | - | - | 6 | 58 | 50 |
| Loha Bazar | 19 | 47 | 66 | 66 | - | - | 1 | 67 | 120 |
| Ganga Mandir Shopping Cent. | 29 | 126 | 155 | 154 | 1 | - | 3 | 158 | 170 |
| Chauburja | 35 | 32 | 67 | 67 | - | - | - | 67 | 70 |
| Hospital Road | 32 | 51 | 83 | 80 | 3 | - | 6 | 89 | 90 |
| Mathura Gate | 14 | 52 | 66 | 65 | 1 | - | 3 | 69 | 85 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Atal Band Mandi | 19 | 95 | 114 | 113 | 1 | - | - | 114 | 300 |
| Baasan Gate | 18 | 100 | 118 | 118 | - | - | 3 | 121 | 135 |
| Phai Bagh | 1 | 16 | 17 | 17 | - | - | 2 | 19 | 21 |
| Buddha Ki Haat | 9 | 32 | 41 | 41 | - | - | 4 | 45 | 130 |
| Delhi Gate Shopping Cent. | - | 10 | 10 | 10 | - | - | 1 | 11 | 12 |
| Purani Sabji Mandi | - | 38 | 38 | 38 | - | - | - | 38 | 10 |
| Inner Goverdhan Gate | 2 | 5 | 7 | 7 | - | - | 2 | 9 | 15 |
| Total | 333 | 1123 | 1456 | 1423 | 32 | 1 | 51 | 1507 | 2288 |

Source: Based on Personal Survey, 1978

## Table 5-18

### Number of the shops based on organisation, 1978
(Extra Walled City)

| Name of the market | Self | Rented | Total | Owner ship | Partner ship | Semi govern-ment | Vacant | Total | Emp-loyees |
|---|---|---|---|---|---|---|---|---|---|
| Station Road | 4 | 71 | 75 | 71 | 4 | - | 14 | 89 | 155 |
| Bajeria | 2 | 19 | 21 | 18 | 3 | - | 3 | 27 | 48 |
| New Mandi Shopping Centre | 15 | 49 | 64 | 62 | 2 | - | 13 | 77 | 130 |
| Outer Mathura Gate | 6 | 121 | 127 | 125 | 2 | - | 10 | 137 | 170 |
| Outer Kumher Gate | 55 | 29 | 84 | 84 | - | - | 4 | 88 | 120 |
| Exhibition Road | 15 | 96 | 111 | 99 | 10 | 2 | 12 | 123 | 250 |
| Outer Goverdhan Gate | 7 | 3 | 10 | 10 | - | - | - | 10 | 17 |
| New Mandi Yard | 60 | 3 | 63 | 53 | 10 | - | - | 63 | 270 |
| Malahe | 10 | - | 10 | 10 | - | - | - | 10 | 22 |
| Total | 174 | 391 | 565 | 532 | 31 | 2 | 56 | 621 | 1,182 |

Source: Based on Personal Survey, 1978.

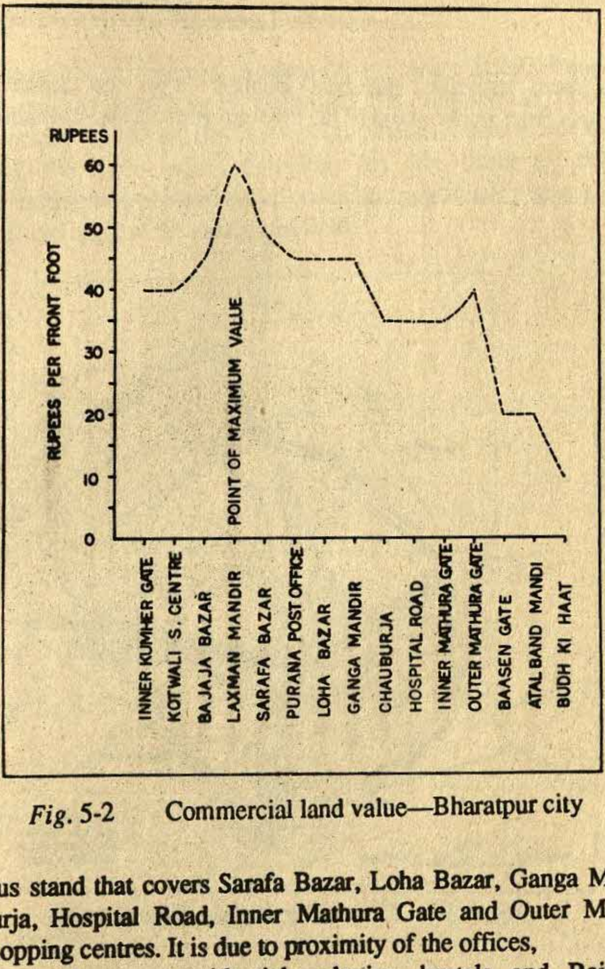

*Fig.* 5-2 Commercial land value—Bharatpur city

ways bus stand that covers Sarafa Bazar, Loha Bazar, Ganga Mandir, Chauburja, Hospital Road, Inner Mathura Gate and Outer Mathura Gate shopping centres. It is due to proximity of the offices, college, shools, new residential colonies, hostels and Rajasthan roadways bus stand. Here the rent of the shops varies from 250 to 400 rupees per month. (Fig.5-2)

Middle rent sector: It is confined to the north and west which covers Station Road, New Mandi Shopping Centre, Kotwali, Inner Kumher Gate, Outer Kumher Gate and a part of Exhibition Road. The rent of the shops varies from 150 to 200 rupees per month. And the rest of the market centres fall under the low rent sector.

An important economic advantage to central city location has always been accessibility. If it is possible to view the market as a full circle, then, naturally, the best location is in the centre. There, customers from all the parts of the city can gain access with equal ease.

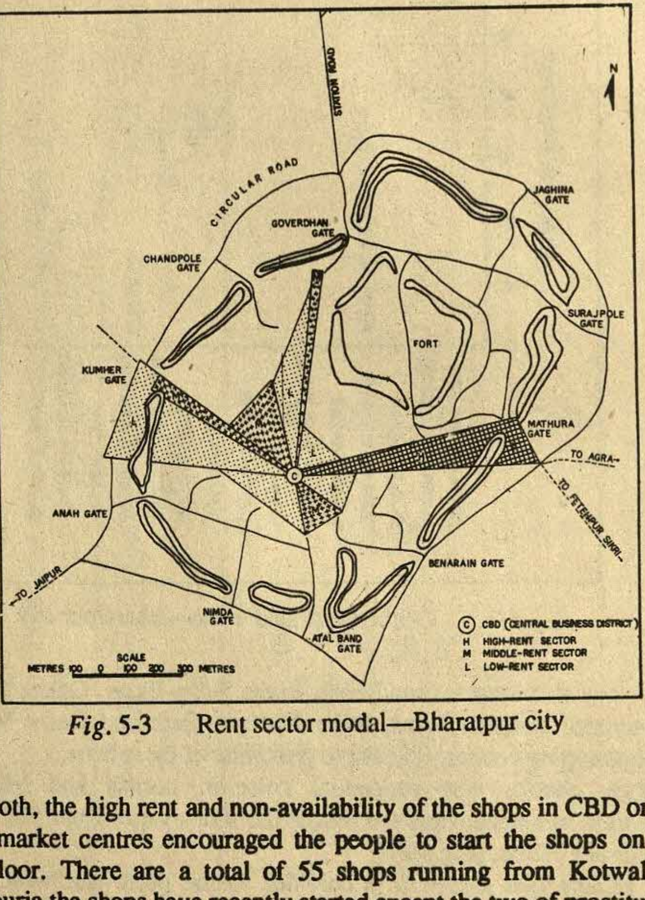

*Fig.* 5-3 Rent sector modal—Bharatpur city

Both, the high rent and non-availability of the shops in CBD or the main market centres encouraged the people to start the shops on the first floor. There are a total of 55 shops running from Kotwali to Chauburja the shops have recently started except the two of prostitution which have been running since 1925 from the time of Maharaja Brijendra Singh. Most of the shops are of tailoring, photo-studios and band masters.

**Commercial Command Area:**

Commercial landscape of any city not only attracts the local customers but also those who are living in its environs. The extent of the area around a commercial landscpe from where it commands its customers may conveniently be termed as the commercial command area. The author during his field survey interviewed hundred customers at each of the three main enterances for city (Railway station, Rajasthan roadways bus stand and Kumher gate) who are visiting from different places outside the municipal limit.

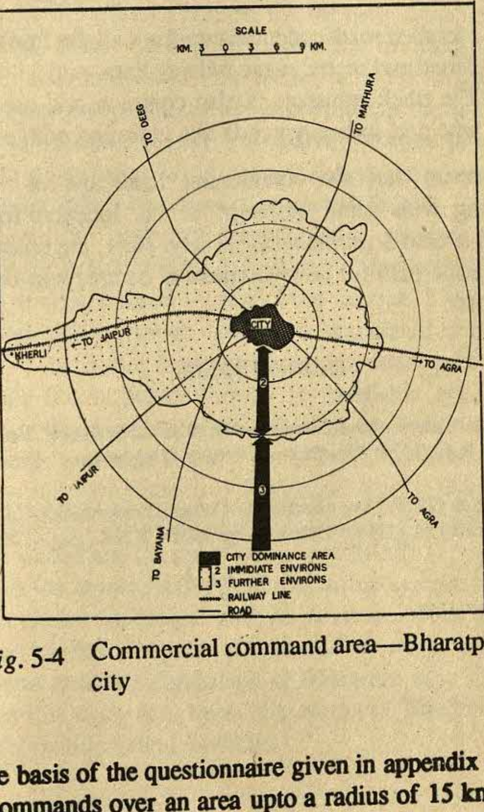

*Fig.* 5-4 Commercial command area—Bharatpur city

On the basis of the questionnaire given in appendix 4-K it is found that city commands over an area upto a radius of 15 km. on all fronts but on the western side it extends upto 30 km. due to convenience of trains and non-existance of the nearest market centre in this direction. Most of the customers visit the city for grocery, medicines, ornaments, cloth, books, general merchandise and agricultural implements and also for repairing machinery parts. Generally, the number of customers decreases as the distance of the customer's place increases from the city centre. On the basis of the distance the command area may be divided into three divisions.

(1) Area of city dominance.
(2) Area of immediate environs or city prominence.
(3) Area of further environs or city association.

Mode of conveyance is also an important factor which influences the commerce of any city. The commercial landscape of Bharatpur is increasing day by day due mainly to the following factors :-

(1) Metalled roads meet the city from all the fronts.
(2) Broad and metre guage railway lines. and
(3) The truck transport is also common and used by those who deal in heavy goods like grain and edible oils.

It is observed that the commercial landscape of the city is increasing along with some problems of the location for the new establishments is also a problem of the city. Now, the solution for the problems and a site plan for new commercial centres will be discussed in the last chapter.

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# 6

# INDUSTRIAL LANDSCAPE AND RURAL ECONOMIC CHANGE

Industry, of course, is a livelihood, and livelihood is a facet of culture. In the western culture, the majority of the population owes its livelihood either directly or indirectly to industry and its related products and services[1]. In the eastern world invariably the cities have a much lower percentage of the population in the industrial sector. The industrialization is closely interwoven with the physical environment and with other facets of culture and the industrial revolution is a series of ideas spreading by means of cultural diffusion.

"Industrial landscape constitutes a separate class of a zonal anthropogenic landscape. Most industrial landscapes belong to the neo-landscape type created by man from scratch. They are not direct but incidental anthropogenic landscape, associated with man's industrial activity[2]." Industrial landscape is an important part of the area. It is a landscape not normally formed for aesthetic appeal but shows the utility for the area in connection with raw material or raw minerals which are available there. Each level of manufacturing activity produces its own distinctive landscape. Infact, industrial landscape is the function of resource anatomy, process of conversion, integration and expression and the processes of evaluation.

Thus the industrial development influences the economic activities of the cultural landscape and its environs. This chapter deals with industrial evolution, spatial distribution of major industries, industrial estates and industrial landscape of Bharatpur city. The most important aspect of this study is to know the impact of Bharatpur industrial town on the economy of rural environs.

## Industrial Evolution

Upto the end of the last century Bharatpur was an industrially backward state. Only very few people were engaged in industries that too of cottage scale. However, salt was produced in large quantities out of the brine drawn from saline wells in not only Bharatpur city but almost all the towns and important villages of this district.

Therefore, the principal trade of Bharatpur city upto 1879[3] was in salt. Thus the *Namak Ka Katla* was a very wealthy and flourishing part of the city. Besides this, the other economic activities like weaving, dying, manufacture of iron utensils, carpentry, pottery, leather tanning and basket making were also prevalent. In this period the chanwar (fly whisk) fans of sandal wood, moodhas and ivory also were important items in manufacturing sector. The method of production was rather primitive, and the produced articles were of coarse quality. Till 1948,

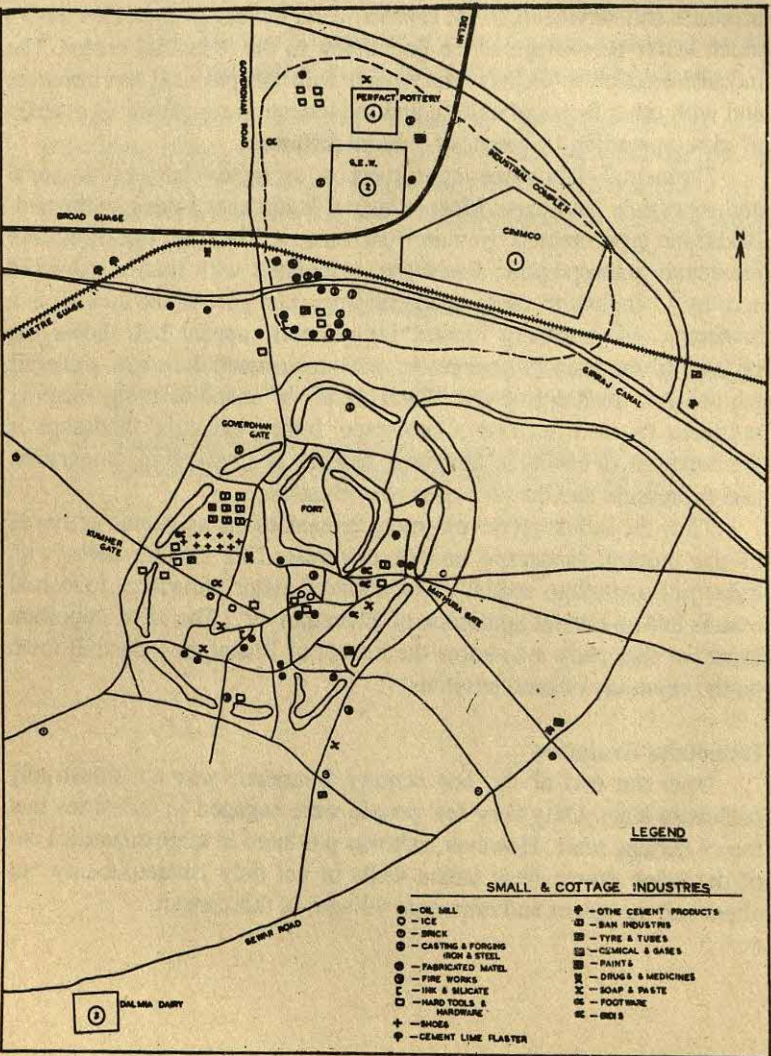


*Fig.* 6-1 Bharatpur—Location of industries the important industries were furniture making, metal works, oil mills and repairing of automobiles. The real tempo of industrial development started only after 1956 when the wagon division of the Central India Machinery Manufacturing Co, Ltd., (CIMMCO), was established towards the north-east of the city.

Twenty one years ago the north-eastern part of the city was under thick jungles and barren land. Now it gives a new look with the growing lamps of industry and urbanisation. At present the major industries are located in the north of the city. Thus industrial landscape in the city environs can be divided into three parts: Industrial estate, Industrial area and the RIMDC or RIICO area. (Fig. 6-1)

In the third five year plan when the government of India implemented the scheme of industrial estates, Rajasthan played its own role in this regard. Industrial estates to develop small scale enterprises were established in several important cities, Bharatpur was one of them.

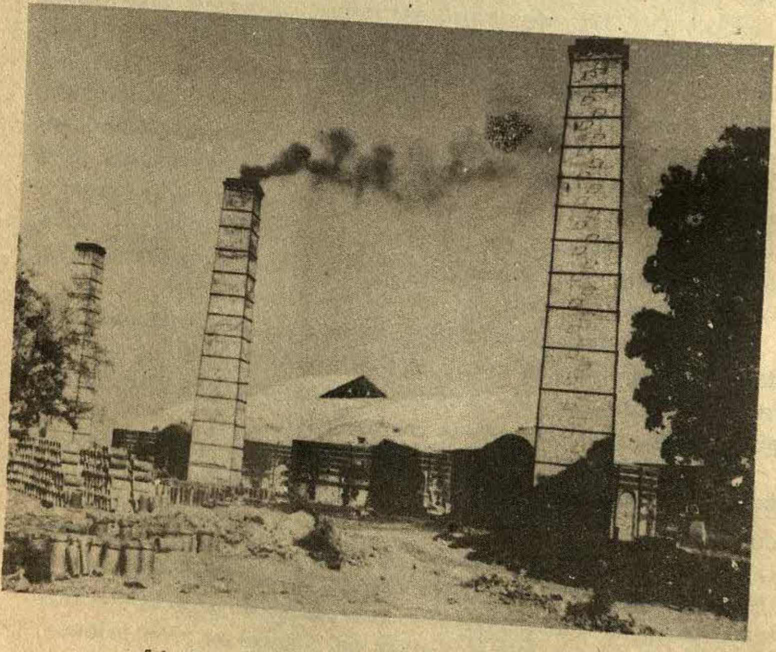
The industrial estate of Bharatpur is situated north of the walled city but limited to the east of the Goverdhan road and south of the metre-gauge railway line. Industrial estate in Bharatpur was started on 20th December, 1959 with a view to construct 12 A class sheds and 32 B class sheds but due to economy cuts 12 A class and 14 B class sheds have been constructed with an approximate cost of Rs. 6.50 lakh. Out of these sheds five have been allotted to the industrial training institute, Bharatpur and 14 sheds to various industries and remaining 7 sheds are lying vacant for allotment. All the new industries are being set up in these sheds. Some of the manufacturing products are steel furniture, brass holders, almirahs, tin containers, glass items, toys, G.I. pipes, steel measuring tapes, motor fans, electric shokers, transformers and the asbestos cement pipes.

To the north of the industrial estate, the State government also developed an industrial area for the economic uplift of the city. Important products of this industrial area are drainage pipes, cement pipes, paints, nut & bolts, stonewares and rivets.

Over and above the industrial estate and industrial area there is the Rajasthan Industrial and Mineral Development Corporation (RIMDC) covering an area of about 77 hectares. It has 98 plots for a variety of industries out of which production is going on in 12 plots only. Thus the industrial development of the city is a recent phenomenon and the major industrial establishments are only about two decades old. Now, some major industries (large, medium and cottage) are given below.

## CIMMCO

'Cimmco' stands for Central India Machinery Manufacturing Co. Ltd., established by Shri R.K. Birla in 1956-57 and the foundation stone of which was laid by late Shri Lal Bahadur Shastri, the then railway minister in the central cabinet. The factory situated between the broad-guage and metre-guage railway lines in the northern part of the city is spread over an area of 165 hectares. Due to various reasons the factory could not be set up at Sawai Madhopur, as it was planned earlier. Cimmco wagon factory has an investment of Rs 2.75 crores in plant and machinery and Rs 2.80 crores as working capital. This factory provides employment to about 4,000 persons as staff and casual labour. In 1962 this railway wagon factory switched over the manufacture of metre-guage wagons because of the other workshop was constructed for starting the manufacture of broad-guage railway



*5.1 Perfect Pottery - Industrial area Bharatpur.*

wagons. The production of the wagons started in August 1962 with its capacity to produce 150 wagons per month. By 1965, the factory has developed its capacity to build 125 wagons of metre-guage as well as 60 of broad-guage per month. Till the end of 1975 the production capacity of railway wagons had reached 2500 per annum.

The structural division of the 'Cimmco' has a licenced capacity of 15,000 tons per annum but its installed capacity was 6,000 tons by 1965. The management has further expanded the manufacturing operations and is now establishing full-fledged shops for the following new types of equipments:

1. Manufacture of different types of electric cranes, including overhead travelling and mobile cranes.
2. Pressure vassels for chemical plant and aluminium plants, etc. and
3. Mining equipments.

The management has a plan to develop the factory into a good medium sized steel structure workshop to meet the requirements of Rajasthan and other neighboring states. Raw material like iron ore or wood for the use in the factory is not available near Bharatpur. The wood is brought either from U.P. or Punjab. Similarly iron is also brought from Bihar. There are no difficulties in getting raw materials as well as the connections with the places of raw materials.

The factory has faced some problems such as insufficient water supply in summers, flood problems in monsoon season as factory lies in a low lying area and high cost of raw material. In spite of these problems this factory is making good progress in national building. It supplies rolling stocks for railways and heavy and sophisticated steel structures for irrigation and power projects and steel fertilizer plants.

### The Perfact Pottery Company Ltd. Bharatpur

This factory lies in the industrial area. It is a branch of the Perfact Pottery Company Ltd. Jabalpur (M.P) where it was established in 1905. In this city, the factory started in 1963 but the production could start only since 1st March 1964. The company invested Rs. 21 lakh while its share capital was Rs. 6.5 lakh. The raw materials like coal and fire clay are obtained from Kolayatji (Bikaner) and Bihar. The factory produces stone wares, pipes and fittings of all varieties and are generally exported to Delhi, Punjab, Uttar Pradesh, Jammu and Kashmir and also supplies to the Indian railways.

### Dalmia Dairies

It is another large/medium scale plant situated on the Sewer road nearly 2.5 km. away towards south-western part of the city. This is the only plant which lies out of the industrial area. Total investment as fixed capital is approximately Rs 2.5 crore. It is manufacturing milk powder, sweet milk, butter and baby food, etc. and employs about 300 workers. The total production is about Rs. 6 crore worth.

### General Engineering Works

This factory lies in industrial area towards north-west of 'Cimmco' and covers 19.9 hectares of land. It manufactures rail tracks, rail points and tracks fitting, etc. and gives employment opportunities to about 1,000 persons. The fixed capital invested Rs. 1.50 crore whereas the working capital is Rs. 0.75 cror. The annual production is about Rs. 4.50 crores worth.

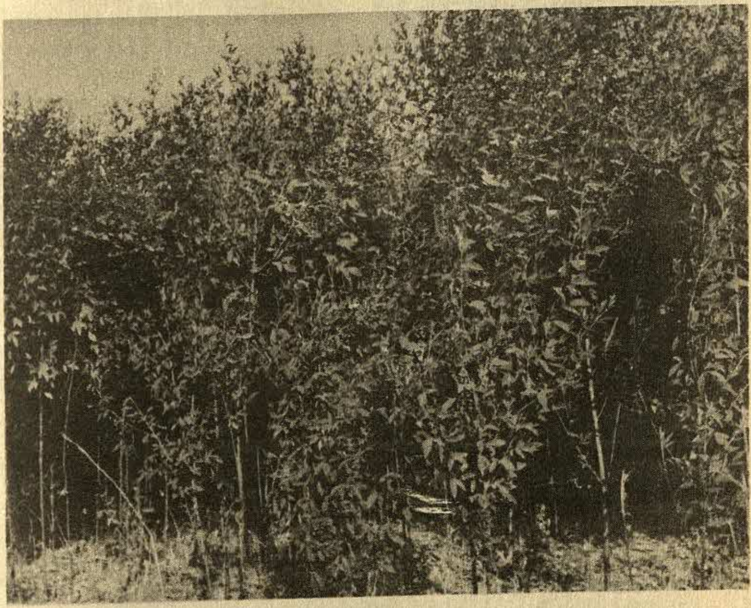
### The Small and Cottage Industries

The small and cottage industries are mostly for the persons of middle class group. These people do not have sufficient funds to meet out the needs of their units. Here the total number of industries is 330 and provide employment opportunities to about 4,000 persons[4]. The cottage industrial units are mainly scattered within the walled city and also in extra walled city at Mathura and Goverdhan gates. Major small and cottage industries are given below:

### Edible Oil Mills

Lately Bharatpur became an important centre for the edible oil production as the surrounding environs is well known for 'lotni' variety of mustard. Before 1958 there were only two oil mills viz. Bharat oil mill and Brijendra oil mill but closed after some time. In 1958 Brijendra oil mill renamed as Hari oil mill. The number of mills became 5 by the year of 1962 due mauily to more facilities of electricity from the new power house. Now, there are 95 mills which employ nearly 800 workers. These mills are scattered throughout the city.

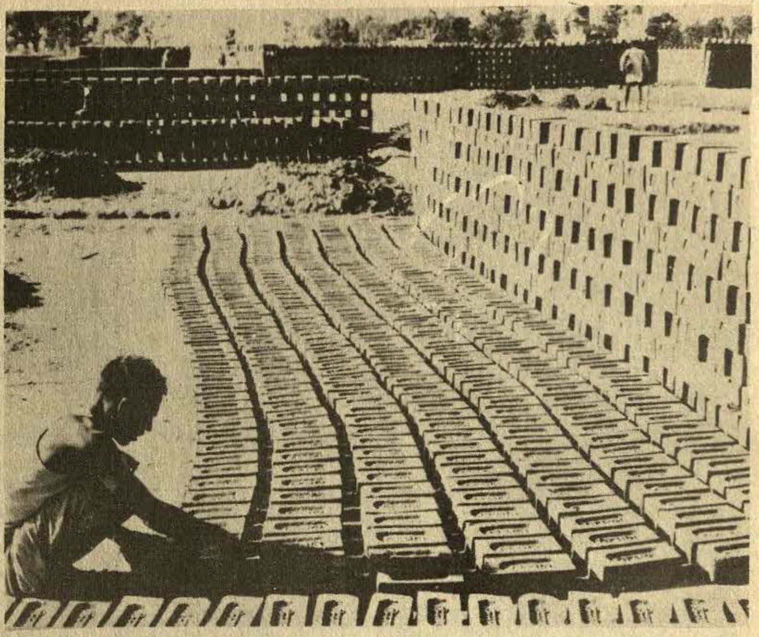
However, the main concentration is near New mandi yard. All these mills require approximately 2 thousand bags of raw mustard per day for the production of 800 qtl. of oil. Ninety per cent of the total production of oil is exported to the eastern states viz. Bihar, Assam, Orissa, Bengal, etc. Engine mark mustard oil is very popular throughout the country. The oil cake is also sent to Punjab, Bengal and U.P.



*5.2 City's rural environs is very fertile for 'Lotni' a variety of mustard.*

**Bricks Production**

The history of bricks production is not very old. The first brick factory "Brimco bricks" was started at Ghana road in 1958. At present there are six bricks industries, working outside the city wall particularly in the southern part. The different types of bricks are manufactured here. Nearly 5 hundred workers are engaged in these factories. The annual production of bricks is worth of Rs.2 crore.



*5.3 Landscape of Bricks production on Sewar road, Bharatpur.*

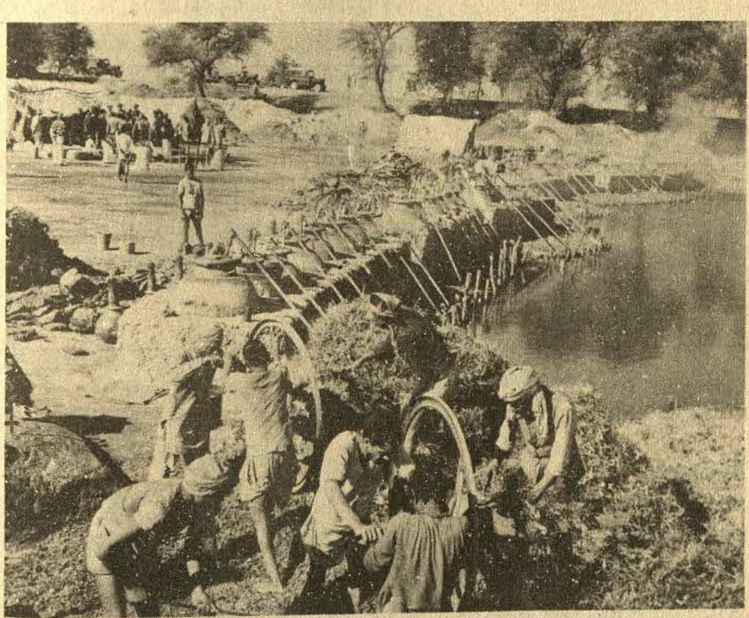
**China Crackers Factory**

The production of china crackers is also important in the city. The oldest crackers industry is the Prabhat fire works which started in 1960 with a total of 58 workers. At present three factories are working here out of seven factories of Rajasthan. The annual production is about 131 tons valued at Rs.15 lakh. The total regular workers are about 100 and nearly 300 families of the city are partly dependent on this industry. Seventy per cent of the total production is exported to the neighbouring states e.g. Gujarat, M.P., and U.P.

**Khus (Vetiver) Industry**

Khus is the best in the country for commercial uses, specially for soaps, medicines, and fixation purposes of high perfumes.

Khuskhus plant (Vetiveria zizanioides) is a clump forming grass growing upto 2 to 3 metres in height. It readily scapes from cultivation and has become naturalized in the large area of Keola deo village (Ghana forest). This place alone has about 1200 hectares area under Khuskhus plant. The oil is obtained from the roots which are very sweet and scented. The larger and thicker roots are used for fans, screens, sunshades, baskets, etc.



*5.4 Khus Oil being distilled by indigenous method at Ghana lake.*

Its oil is still distilled by indigenous country method. The labour for distilling khus comes from U.P. as they are experts in it. In 1968, the khus oil samples from here were analysed at Forest research institute, Dehradun and the results were as follows:

The below results show that khus from keola deo ghana forest is very good and is considered to be the best in India.

**Table 6-1**

**'Khus' Specification**

| **S. No.** | **Properties** | **Khus oil of** | |
|---|---|---|---|
| | | **Keola Deo Ghana Forest** | **I.S.I. Specification I.S. 1171-1957** |
| 1. | Sp. Gravity at 20łC. | 0.9973 | 0.990 to 1.032 at 30łC. |
| 2. | Ref. Index at 20łC. | 1.5210 | 1.512 to 1.523 at 30łC. |
| 3. | Optical rotation of 20ł | -94.4 | 50 to 130 |
| 4. | Ester Value after acetylation | 196.4 | 145.0 to 200ł. |
| 5. | Total alcohol, percentage as vetiver oil | 90.4 | 70.0 Minimum. |

Source: F.R.I. Dehradun, 1968.

**Ban Industry**

This cottage industry is also very old in the city. The Lawania sikhs have been manufacturing the ban since 1948 because of the raw plants (Saccharum munja) are found throughout the environs. Nearly 40 families are engaged in the ban production with fixed capital Rs. 1.33 lakh. The production of ban is 80 tones per annum. This cottage industry has its main concentration in *Namak-Ka-Katla*. It is situated in a depression where water is collected for use in the wetting of the raw material. Lawania Sikhs have therefore assembled in this locality.

**Manufacturing of General Hardware and Hardtools**

These industries are manufacturing the trollies, seed drillers, trailers, ball, rivets, wire bolts, rolling shutters, iron doors and agricultural implements. Most of the factories are found in the industrial area, industrial estate, specially out of Kumher gate and Mathura gate.

### Foundries for Casting and Forging Iron and Steel

Gurunanak steel rolling mill is the first rolling mill which started in 1955 and lies on station road in Ranjit nagar. At preset there are 13 working rolling mills with fixed capital of about Rs. 20 lakh and providing employment opportunities to about 400 workers. These mills are manufacturing different types of bars, metric weights, round angles, channels, etc. Most of the mills are located in industrial area and industrial estate.

### Manufacture of Fabricated Metal Products

At present there are eight industries and located at Mal godown road in industrial estate. Such industries are making containers, boxes, steel boxes, etc.

### Shoes Manufacturing

Shoes are made from local hides. Most of the shoe makers are living in Jataw mohalla and Mochipara. About 100 workers are engaged in the shoe making. These local shoes are supplied to the rural environs.

### Ice Manufacturing

In Bharatpur, only six small factories are manufacturing ice and producing about 90 tons per day in the summer season. These factories are lying along the main market centres.

### Industrial Complex

Most of the city's industrial activity is found in the northern part specially in the industrial area and industrial estate. On account of a multifarious industries, small and large this area may be termed as industrial complex. The other industries are scattered throughout the city. The total land for industrial use is 654 hectares which consists 19 per cent of the total area of the city landscape.

### The Industrial Component in Cultural Integration

Manufacturing geography is concerned with location of manufacturing and the causes and implications of the location[5]. Many aspects of culture influence the location of industry. Among the most important cultural aspects are economic and political. Industry has a broader role in culture as well creating cultural change.

### (1) The Economic Elements in Industrial Location:

a. *Labour supply:* Labour availability is an essential factor for location of a factory. The environs of Bharatpur city has high population density and therefore, the labour comes from a distance of 10 to 15 kms. Some large scale industries like Cimmco, Dalmia dairies, General engineering works, Perfact Potteris and Rajasthan pigments, etc., partly depend on a supply of skilled workers. These laborers mainly come from other states viz. U.P., West Bengal, Maharashtra, Delhi and Tamil Nadu.

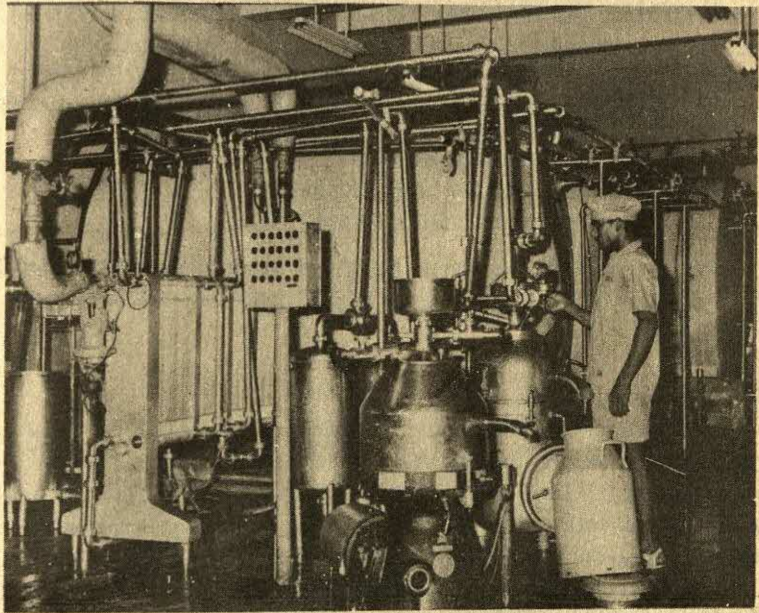
b. *Markets*: The size and distribution of markets are generally the most important factors in determining the spatial distribution of industries. 'Cimmco' supplies the railway wagons to the Indian railway. Edible oil has its very big market in the state and the other products are supplied throughout the Rajasthan and neighboring states.

c. *Transportation*: Transportation innovations have played a major role in the development of the industrial revolution. Bharatpur is well connected with road transportation from all the fronts. The truck service is also quick and cheap which may be available at any time to any destination throughout India. There are twenty transport companies in Bharatpur mainly located near Main mandi yard. It also occupies a very significant position on both the metre and broad guages of the western railway.

d. *Financial assistance:* Financial facilities, nominal taxes on raw material, exemption from taxes on imported machines, loan facilities to industrial cooperatives, and allotment of industrial land on long leased concessional rates are favourable aspects to encourage the industrial development of the city by the state government.

### (2) The Political Element in Industrial Location

Political element influences the spatial distribution of industrialization is common. State government often intervene directly in decisions concerning industrial location. The development of major industrial complex in Bharatpur is practically due to Mr. Raj Bahadur, the former Central Cabinet minister who changed the ideas of the time and brought Bharatpur on the industrial map of India.



*5.5 Some industries partly depend on a supply of skilled workers, one example in this Dalmia Dairy on Sewar road.*

## Industrialization as an Agent of Cultural Change

Industrialization is the most potent and effective agent of cultural change ever to operate. Some of the more important factors for changes brought by industrialization include increased trade and intercultural contact, basic alterations, in employment patterns, a shift from rural to urban for vast number of people, the release of women from the home and increase of government influence and functions. Industrial development in a region typically produces a restructuring of employment.

## Industrial Landscape

Industry shapes the landscape in many ways. The manufacturing landscapes of industries are most notable in the form of factory buildings towards the north of the city (In Industrial complex) and towards south-east (Dalmia dairies). The factories are appealing and surrounded by residential areas or located in between the commercial centres as inside and just outside the walled city. Some other industrial activities are observed in the open space like brick industries, out the walled city. Thus the whole of the industrial landscape of Bharatpur may be classified into three types according to the formation. i.e.,

1. Complex industrial landscape,
2. Scattered industrial landscape, and
3. Open space industrial landscape.

And the industrial landscape has given an employment to about 9,500 workers out of which seventy four per cent come from the rural environs.

**Rural Economic Complex**

The pattern of settlements in India is characterised by a vast number of nucleated villages predominantly having agriculture as the economic base. There is a gross inadequacy of socio-economic and infrastructural outlets in these villages owing to the large migration of people in the working age group to urban centres.

Settlement system is taken to mean a network of settlements within the framework of a definite territory which are linked together by common demographic bonds, industrial ties and a system of services for the population. The rural settlements have their different sets of economy. In the environs of Bharatpur, all the three types of economic activities are found.

*Primary industries*: Such industries are those involve in extracting natural resource from the earth. Agriculture is one of the primary industries. Bharatpur city environs has mainly the agricultural activity. The percentage of workers engaged in this activity contributes 84.82 which is more in comparison to the all India level i.e. 72.05 per cent. Fourteen per cent of the total settlements of environs have hundred per cent primary occupation. The table 6-2 shows the distances from Bharatpur city and percentage of workers engaged in primary, secondary and tertiary industries. For convenience the area has been divided into four zones at the interval of per 6 kms. distance from the city. In each zone again per one km. wise analysis of workers has been given.

## Table 6-2

**Means in each mile of distance from Bharatpur (Economic aspects) (1971)**

| Distance | Percentage of primary workers | Percentage of secondary workers | Percentage of tertiary workers |
|---|---|---|---|
| Upto 1km. | - | - | - |
| 1 to 2 " | - | - | - |
| 2 to 3 " | 45.33 | 2.11 | 52.54 |
| 3 to 4 " | 77.53 | 8.22 | 14.24 |
| 4 to 5 " | 78.17 | 3.76 | 18.06 |
| 5 to 6 " | 66.26 | 7.31 | 26.42 |
| Ist 6kms. zone | 70.57 | 6.06 | 23.36 |
| 6 to 7km. | 77.16 | 5.59 | 17.23 |
| 7 to 8 " | 82.56 | 4.68 | 12.74 |
| 8 to 9 " | 66.39 | 2.35 | 11.25 |
| 9 to 10 " | 86.61 | 2.24 | 10.68 |
| 10 to 11 " | 87.63 | 2.07 | 10.29 |
| 11 to 12 " | 89.01 | 2.43 | 8.55 |
| IInd 6kms. zone | 85.61 | 2.96 | 11.34 |
| 12 to 13km. | 87.68 | 2.36 | 9.96 |
| 13 to 14 " | 90.18 | 3.45 | 6.35 |
| 14 to 15 " | 76.16 | 6.57 | 17.26 |
| 15 to 16 " | 90.42 | 3.09 | 6.47 |
| 16 to 17 " | 86.85 | 4.01 | 9.13 |
| 17 to 18 " | 80.41 | 6.03 | 13.55 |
| IIIrd 6kms. zone | 83.11 | 4.83 | 12.05 |
| 18 to 19km. | 88.41 | 3.65 | 7.93 |
| 19 to 20 " | 86.31 | 4.72 | 8.95 |

| | | | |
|---|---|---|---|
| 20 to 21 " | 86.64 | 4.30 | 9.05 |
| 21 to 22 " | 89.41 | 4.49 | 6.08 |
| 22 to 23 " | 88.67 | 3.72 | 7.60 |
| 23 to 24 " | 88.33 | 4.10 | 7.56 |
| IVth 6kms. zone | 87.84 | 4.17 | 7.79 |
| City environs | 84.82 | 4.32 | 10.86 |

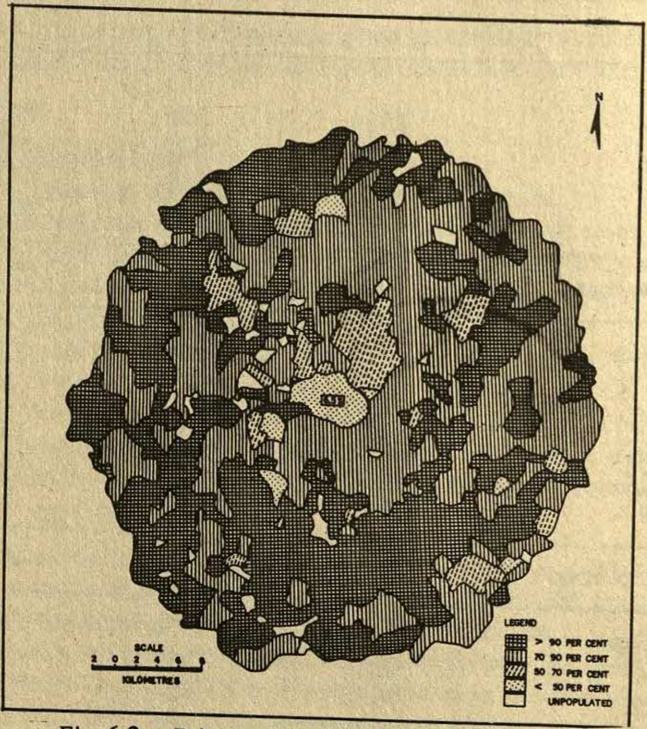


*Fig.* 6-2 Primary workers—Bharatpur city environs

The above table depicts that the first six kms. zone has only 70.57 per cent of primary workers which is least of all the zones. The correlation analysis of the percentage of primary workers and distance shows a positive relationship upto 12 kms. In this zone, the correlation matrix values vary from 0.920 to -0.991 with scheduled caste and tertiary workers respectively. It shows insignificant positive correlation between primary workers and other variables. The second zone has correlation values of 0.427 and -0.794 with sex ratio and population growth, respectively. Positive correlation is also weak between primary workers and other variables like sex ratio, scheduled caste, total workers and medical facilities. The negative correlation value with population growth is due to the migration of population from the outer zones to Bharatpur city for the services in industries and secondly a vast area of the zone is unpopulated due to the existence of Ghana forest and flood prone area. In the next zone, the values vary from 0.797 with scheduled tribes to -0.949 with population density. Thus it may be said that most of the scheduled tribes are working in primary occupation. In the fourth zone, the correlation value is 0.901 with scheduled caste at one per cent level of significance. It shows that almost all scheduled caste population is engaged in agriculture.

The city environs as a whole has positive correlation of 0.792 with total workers and a negative correlation of -0.994 with tertiary workers. It shows that most of the workers are engaged in primary activities.

First six kms. zone has very low intensity of primary workers, because of service-cum-industrial characteristics of this zone. However, the high intensity of primary workers i.e. 75 to 90 per cent is found in small patches in the west, east and south-eastern part of the region (Fig. 6-2). In the second zone, there is also a small patch of low intensity of primary industrial workers towards the south-western part. But the western and eastern parts have some patches of high intensity which extend upto the outer zone mainly in the southern part and here a narrow strip of very high intensity has existence along the outer most zone. The third six kms. zone has high and very high intensities of primary workers in the entire northern, southern and eastern parts. However, in between them, along the transport network, there is a combination of the low and high intensities and also unpopulated settlements. Fourth zone has very high proportion of the primary workers.

Thus a gradual increase in the proportion of primary workers can be noted with the increase in the distance from Bharatpur city, except a slight decrease in the third zone.

*Secondary industries*: Secondary industry is known as processing stage, generally called manufacturing. The workers engaged in these activities is only 4.32 per cent. This proportion is very low in comparison to the national average (11.20 per cent of the total workers). The percentage of workers engaged in these activities vary from 2.07 to 8.22 in the 10 to 11 km. and 3 to 4 km. circles, respectively. (Table 6-2) On the basis of 6 kms. zones the percentage of workers in the secondary activities varies from 6.06 per cent in the first zone to 2.96 per cent in the second zone.

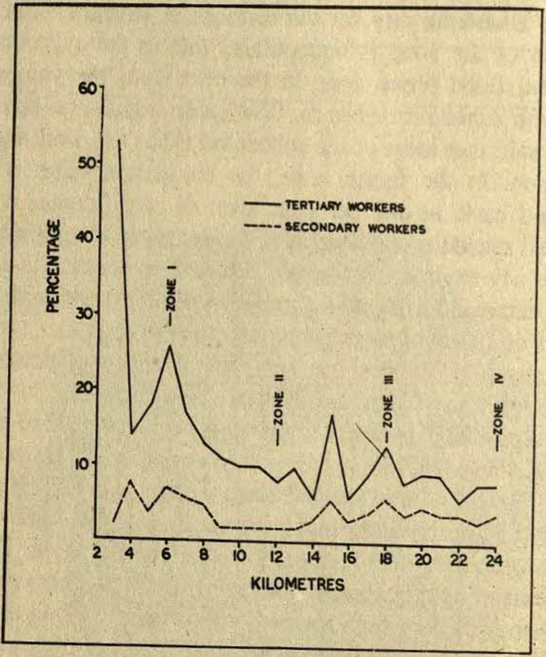


*Fig.* 6-3 Secondary and tertiary workers—Bharatpur city environs

Figure 6-3 shows that there is inverse relationship between the distance and the percentage of secondary workers. A high proportion of the secondary workers is confined up to the radius of 4 kms followed a sudden decline in 4 to 5 km. distance and again it goes high at 6 kms. circle. In the next zone there is a decline trend upto the distance of 9 kms. and straight line upto 13 kms. After this followed by a slight curve. This shows that the percentage of workers engaged in this category is almost same.

In the first zone, there is low correlation of secondary workers with sex ratio, scheduled caste, total workers and the social amenities. The values of correlation vary from 0.749 with educational facilities to -0.840 with population density. (Appendix 2-G) The **negative** correlation between secondary workers and population density is due mainly to the migration towards Bharatpur city. The positive values of correlation vary from 0.890 with tertiary workers to -0.833 with sex ratio. The low sex ratio is due to the migration of male population to the city region. Insignificant correlation among the variables if found in the third zone. The values of correlation vary from 0.965 with density of occupied residential houses to -0.957 with scheduled tribes. The fourth zone has low correlation with variables. The values of

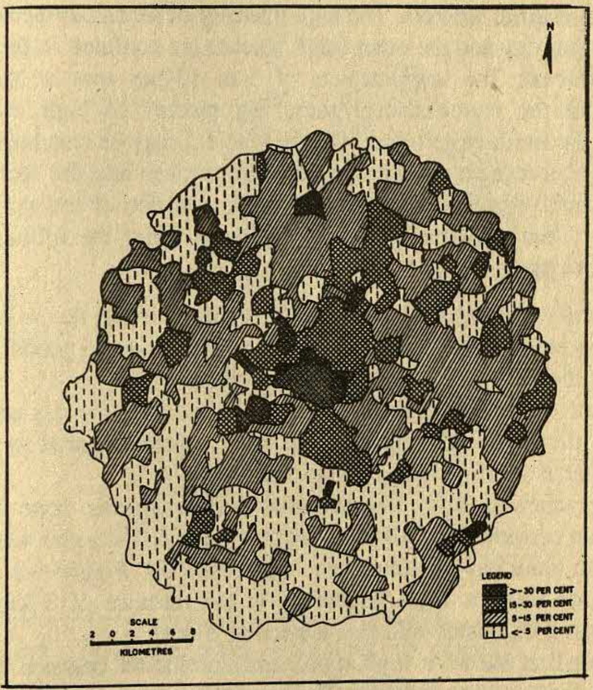


*Fig.* 6-4 Secondary workers—Bharatpur city environs

The Bharatpur city has the highest proportion of the tertiary workers, i.e., 67.7 per cent, followed by Fatehpur Sikri town (35.2 per cent).

The analysis of the region reveals that Bharatpur environs has very low proportion of settlements in the tertiary sector, i.e., 2.2 per cent or 2.9 per cent of the total population. Almost all the settlements of high percentage of tertiary workers belong to scheduled caste population. The proportion of tertiary workers and the distance from the city inversely related. Bharatpur city's influence is observed upto the distance of 14 kms (Fig. 6-3).

One of the most significant events today is the spread of industrialization which has brought a great number of far reaching cultural change. The studies and observations reveal that the industrial revolution has modified the culture and the cultural landscape of Bharatpur city so greatly that people who lived here a three decades ago would be puzzled by the modern setting of large and medium scale industries. The impact of industrial activities on the environment is clearly seen which has reached alarming stage towards the north or the industrial area of the city. But the relationship between industry and the land are not one-sided. The environment influences industrial location. Through the approach of cultural integration, it is observed that industrial location is often motivated by economic and political factors and also related with many other elements of culture. In Bharatpur, the complex area of industrial activity is familiar where the transport network of railways and roadways is easy connecting web for the industries. Labour supply, an essential aspect for the industrial landscape which is not sufficient in Bharatpur and therefore it looks towards the environs. Thus the economic structure of the environs is changing as according to the development of industrial activity (the heart of the secondary industry) of the city. It can therefore, the concluded that the industrial landscape has influenced the economic activity of the people not only in the town but also the environs upto the radius of 9 kms.

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## 7

# SOCIAL AMENITIES

Social amenities are essential parts of a community. In term they develop economy of the area. In fact, the economic development can not take place until and unless the infrasturctural facilities are induced in an area. The rural settlements should be provided with the infrastructural facilities by regional development programme. But in India the imbalanced development occurred because of the colonization policy adopted by the Britishers who made urban centres the strategic points for their administration. India still has the same trend of development of urban centres as they are still the bases and centres of administrative set-up. In urban centres more and more social amenities are provided. Their failure to transmit the growth impulses to the hinterlands, leads to the creation of spatial disparity which is the result of the lacking of centres to the vast space of underdeveloped landmass surrounding them.

Nearly 80 per cent of the population lives in the villages. The migration of the people from villages to cities can be halted by providing these facilities in the rural set-up. In this chapter, the author analyses the spatial variation in the distribution of the social amenities in Bharatpur city and its environs.

### Social Amenties In Bharatpur City

#### Educational Institutions

In fact, education is one of the important functions of urban settlements. For the standard of education Bharatpur occupies an important place in eastern Rajasthan. It has a network of schools, colleges and the other types of institutions. In 1946, a compulsory primary education bill was added for the state[1]. In this way many primary, middle, secondary and higher secondary schools were started here after 1947. Colleges and the other training centres have also developed.

At the time of Maharajara Ram Singh, Bharatpur High Schools was established in 1895[2]. A girls middle school was started in 1903-4 in the building of district library. The Novel english medium school was started here in 1905. A sanskrit school was maintained at Bharatpur, teaching upto the Acharya examinations of the Banaras Sanskrit college. It was established in 1910 and had an enrollment of 43 students in 1919-20[3].

The most important educational event in the year of 1940-41 was the opening of an intermediate college in order to fulfil a long-felt public desire. The Sardar high school (at present, the Government higher secondary school) had been raised to the intermediate standard. The opening of the college synchronized with the marriage of Maharaja's highness. The college has accordingly been named after her and is known as the Maharani Jaya inter college. In 1941, the college was raised to degree standard in arts and commerce faculties. In 1947, the college was housed in that building which had served as the head quarter of the former political agent of the eastern Rajputana agency. Later , the science faculty was added in 1957.

In 1928-29, a training school for the training of vernacular teacher was opened at Bharatpur under the affiliation of United provinces educational department. B.S.T.C., I.T.I., deaf and dumb school, etc. were also opened in the city to meet the requirement of people of this region. Table 7-1 is showing the number of both the government and private schools and colleges by the year of 1979.

**Table 7-1**
**Number of educational institutions in Bharatpur city, 1978-79**

| School | Boys | Girls | Coeducation | Total |
|---|---|---|---|---|
| Primary | 10 | 5 | 19 | 34 |
| Middle | 9 | 7 | - | 16 |
| Secondary | 2 | 2 | 1 | 5 |
| Higher Secondary | 2 | 1 | - | 3 |
| College | 1 | 1 | - | 2 |
| TOTAL | 24 | 16 | 20 | 60 |

Source: Inspector of Schools Bharatpur, May 1979.

In 1976-77 there were about 31 primary schools whereas 34 schools in 1978-79. Almost all the private primary schools have co-education. There were 16 middle schools with 2,600 students and 204 teachers. There is a boys college imparting P.G. education in a large number of subjects and one girls college upto degree standard. The girls college was started in 1972.

Education pattern can be classified according to the age groups such as primary eduction for the children of 5 to 10 years old, middle education for 11 to 14 years old, higher secondary for 15 to 19 years and college education for beyond 20 years old.

Primary schools are fairly distributed throughout the city. Nearly 80 per cent of them are within the city wall where 70 per cent of the total population of city lives. The primary schools have mainly located very near the houses of the school going children. The schools, located inside the city wall are housed in congested and old buildings which do not have any open space and play grounds.

It is observed that the old buildings situated in the fort's campus have provided the proper accommodations for the development of different educational institutions i.e. one girls middle school, one central school, five primary schools, and one girls college upto degree standard. Mostly the girls schools are lying here. The development of 5 primary and 4 middle schools outside the city wall is due to the existing of new developing colonies and industrial area.

The boys collegs, Govt. higher secondary school and I.T.I. have located outside the city wall due to their requirements of large open space. The condition of schools situated outside the city wall is somewhat better

**Table 7-2**

**Number of schools and school going children in Bharatpur (1975)**

| Age group | Standard | Total students | Average number of students per school |
|---|---|---|---|
| 0-14 | Upto middle | 38,366 | 767 |
| 15-19 | Upto higher secondary | 9,610 | 1,201 |
| 19-24 | Upto degree standard | 8,165 | 4,082 |

Source: Projected values on the data of 1971, District Census Hand book, Bharatpur than the schools of the walled city. The following table details the number of schools and school going children in different educational standards.

In fact, the number of school going children is increasing in the city. Besides, many other students come to get the admission in schools and colleges. Thus the average actual number of students becomes higher. The average number of students is very high in all the different

**Table 7-3**

**Localitywise Post Offices, 1978**

| Post Offices | Location |
|---|---|
| Head Post Office | Pahi bagh |
| City Post Office | Jama masjid |
| Atal Bund Post Office | Mandi atal bund |
| Chauburja Post Office | Chauburja |
| Collectorate Post Office | Inside the collectorate |
| Gopalgarh Post Office | Gopalgarh |
| Industrial area Post Office | Industrial area |
| Jaghina Post Office | Jaghina |
| Kanjoli line Post Office | Kanjoli line |
| Kotwali Post Office | Kotwali |
| Kumher gate Post Office | Kumher gate |
| Laxman Mandir Post Office | Laxman mandir |
| New Mandi Post Office | New Mandi |
| Ranjeet Nagar Post Office | Ranjeet Nagar |
| Sewar Post Office | Sewar |
| Cimmco Post Office | Cimmco factory |
| Anah gate Post Office | Anah gate |
| Krishna Colony Post Office | Krishna colony |
| Ammunition depot P.O. | Ammunition depot |
| Forest Lodge P.O. | Forest lodge |
| R.M.S. | Railway station |
| Agency Post Office | Besides the N.C.C. ground of the college |

Source: Head Post Office, Bharatpur, 1978.

educational standards and therefore the number of educational institutes should be increased according to the demand of student population.

**Postal Service:**

Raj dak used to be the old postal service of the state that used to serve the different parts of the state. In 1948, British postal offices were established in almost all parts of the state and then Raj dak was allowed to carry only state letters. From first January 1897, The Raj dak was completely abolished and the new system i.e. British postal services came into force. However, the City Post Office and Railway Post office already existed in Bharatpur city. British postal services were merged with the Indian postal services in 1952. At present there are two main post offices and 20 branch post offices in the city. The Head Post Office is located in front of the Gandhi park, having a central position in the city. It has a link between walled and extra walled city. The City Post Office is situated in the walled city near Jama masjid. And the other 20 branch post offices are fairly distributed over the landscape. Table 7-3 shows the distribution of the post offices in Bharatpur city.

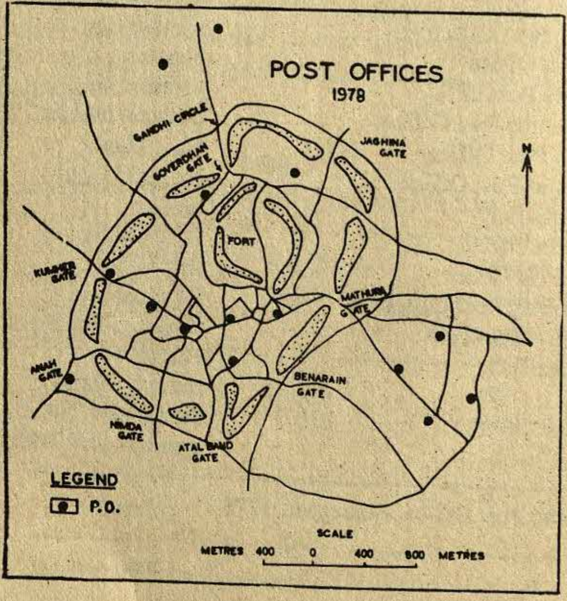


*Fig.* 7-1 Post Offices, Bharatpur city

Figure 7-1 shows that most of the post offices lie outside the walled city. The main concentration is found in the industrial area, new colonies and Ammunition depot. In the walled city, there is one post office for every 7,000 persons while in the extra walled city only 1600 persons. It is concluded that the post offices situated in the walled city have greater pressure on counters. According to P.M.G. norms, Bharatpur city should have nearly 40 post offices.

### Telegraph Offices

The City Post Office was the only telegraphic service centre for the walled city upto 1967. Earlier it was known as District Telegraph Office. From 1968, this office is working in the building of G.P.O. at Pahi bagh. This telegraph office has two direct lines from Bharatpur to Jaipur and Agra. The phonogram services has helped to a great extent in reducing the congestion at the counters of telegraph offices. At present out of the 22 post offices only 7 have the telegraphic facilities. The names of the telegraph offices are;

1. D.T.O. Bharatpur, Pahi bagh
2. City Post Office, Jama masjid
3. New Mandi Post Office
4. Sewer Post Office
5. Kanjoli line Post Office
6. Agency Post Office
7. Ammunition Depot

The number of the telegraph offices is not sufficient here. On an average one telegraph office is serving approximately 5 sq. kms. area or 12 thousand population of the city. Their number should be increased within the walled city mainly at Kumher gate and Kotwali.

### Telephone Offices

The office of the telephone exchange is situated on the college road just outside the Mathura gate. It was opened here in 1964. There were 1,035 telephone connections in the city upto June 1979. The number of the telephone connections in the extra walled city is greater than the walled city. The number of the employees in the exchange is 2004. The maximum number of telephones is concentrated in industrial area. The distribution of telephones is seen along the main commercial centre from Mathura gate to Kumher gate, Outer Kumher gate, Outer

Mathura Gate, Atal bund mandi, New mandi and Outer Goverdhan gate.

**Communication and Transport**

In 1965, the Bharatpur state agreed without a formal document to code land required for railway station and other requisites took about 8 years and line was opened for traffic to Agra on 20th October 1873 and to Jaipur on 20th April 1874. Now Bharatpur junction occupies a very significant position on both the metre guage and broad guage of the western railway. On the broad guage section, the line runs to Delhi in the north-east and Bombay in the south-west and metre guage line connects to Agra in the east and Jaipur in the west. In a day, 18 passenger trains pass through this junction both on metre and broad lines (Appendix 6-A). Besides, many goods trains pass also through here. It has developed a big railway yard due to commercial and industrial importance of the city.

The road transport also has developed here. The city connects from all the fronts by the meteled road.

**Medical and Public Health Services**

Formerly in Bharatpur district, medical profession was largely in the hands of Vaidyas and Hakima who used to follow Ayurvedic and Unani systems of medicine respectively. In 1849, Maharaja Balwant Singh visited a dispensary in Agra. The civil surgeon talked about the benefits of such an institution conferred upon the people. On his return, he immediately opened the City dispensary in Bharatpur town.

Another dispensary was started in Sewer in 1856. On October 7, 1894, a female hospital was opened at Bharatpur by Maji Sahiba (Grand mother of the ruler of the state) and named after herself. That was known as Maji Sahiba Darya Kuar's Female hospital. In 1895, a site was chosen at Charbagh for the Victoria hospital in commoration of the diamond Jubilee of Queen Victoria of England. In December 1911, the female hospital which was lodged in the apartments of Victoria hospital, was shifted to a separate building constructed for this purpose and the vacated wards were utilised for the indoor patients.

Antirabic centre was added to Victoria hospital in August 1933. In 1936-37, an ultra violet rays lamp, a medical diathermy machine and surgical diathermy machines were purchased for the hospital. A separate ward for tuberculosis treatment was opened in 1937 in the same hospital but later on in 1940 it was shifted to the new building at

Sewer. It is known T.B. hospital Sewer. It has separate wards for paediatrics, ophthalmology, radiology and E.N.T. (Ear, Nose and Throat).

A course for auxiliary nurse midwifery for 30 sheets, of two years duration, was started at Bharatpur in 1963 and at present 50 candidates are under going this training. Dais training is also imparted to the volunteers at Zanana hospital, Bharatpur. A big family planning centre has also located in its campus.

Red cross society of India opened a branch in 1943 under a separate supervision. Now, Bharatpur city has the following hospitals and dispensaries in different parts of the city.

**Table 7-4**

**Location of hospitals and dispensaries (Bharatpur city), 1978**

| Name of hospitals and dispensaries | Location |
|---|---|
| General hospital | Mori char bagh |
| Zanana hospital | In the campus of General hospital |
| Satiza hospital | Behind Jama masjid |
| T.B. hospital | Outside the Anah gate(Sewer) |
| Military dispensary | Ammunition depot |
| Railway dispensary | Railway colony |
| New dispensary | Ranjeet nagar |
| E.S.I. | Inside New mandi |
| E.S.I. | Atal bund mandi |
| Ayurvedic dispensary | New Mandi |
| Homoeopathic dispensary | Inside the fort |

Beside these, there is one veterinary hospital for animals which is located on the collectorate road. The number of hospitals and dispensaries is insufficient and the quality of the services is also unsatisfactory. On an average 500 persons visit these hospitals as outdoor patients and 30 patients are admitted as indoor per day. Both the General and Zanana hospitals have 42 doctors and 140 other staff members (1976). This number of doctors and other staff members is low in comparison to the patients attending the hospitals, therefore the proper attention is not being paid to the patients.

The General hospital has a total of 300 beds which is not sufficient for the whole of the city and its environs. It is always overcrowded by the indoor and outdoor patients. It may be suggested that a number of dispensaries be opened within the walled city and a hospital at least of 150 beds be provided outside the Goverdhan gate to command the industrial area, Ranjeet nagar and the north-western part of the walled city.

**Electric Supply**

From the very beginning the street lamps were in vogue in the city. In 1913, there were 432 street lamps and 11 Allauddin lamps on the important roads and thoroughfares.

This city was first electrified in 1922. There was a power house out of the Mathura gate which used to supply electricity not only for Bharatpur but Todabhim Nagar and other neighbouring areas also. In February 1961, another power house was constructed near railway station. After its completion, the old one was converted into R.S.E.B. office. The new power house is connected with 132 KV power line from the Chambal hydroelectricity project. The power house supplies electricity to the city through different KV line feeders.

I. 33 KV line feeder, from G.S.S. to industrial estate .
II. 11 KV line feeders are the following:

| | |
|---|---|
| (a) A separate feeder | To 'Cimmco' |
| (b) City feeder | From the New power house to old power House via Circular Road. |
| (c) Oil industries feeder | From the New power house to the north of the city. |
| (d) Rular feeder | " " |
| (e) Kumher gate feeder | From New power house to Akkhadd, Kumher gate, Anah gate, Atal bund gate, Benarayan gate and upto old power house. |
| (f) Amunition depot feeder | From New power house to Ammunition depot. |
| (g) Inter connection feeders | Walled city. |
| (h) Industrial feeder | Industrial estate. and |
| (i) G.E.W.Feeder | Industrial area. |

The above points give an idea of the power system of the city. There is one 33 KV line feeder hardly of one km. length while the other nine small power lines are of 11 KV line feeders. The 11 KV line feeders supply electricity to the whole city. The following table shows the pattern of electricity consumption.

**Table 7-5**

**Electric power consumption in Bharatpur (1979)**

| Particulars | Connected load in kilo watts | Percentage of the total consumption |
|---|---|---|
| Domestic | 4,607.000 | 17.83 |
| Commercial | 4,409.653 | 17.07 |
| Industrial | 16,081.474 | 62.07 |
| Public lights | 76.860 | 0.29 |
| Irrigation | 527.160 | 2.04 |
| Water works | 121.950 | 0.47 |
| Others | | - |
| Total | 25,824.097 | 100.00 |

Source: R.E.C.B. Bharatpur

The above table reveals that about two-third power is consumed by industries, while domestic and commercial sectors have almost equal shares i.e. 17 per cent of the total consumption.

### Water Supply

Water is an essential and the most important fundamental physiological need of man. It also meets the requirement of industrial sector. Before the construction of overhead tanks, wells and tanks were the only means of water supply. Some of the localities of the city do not have water supply facility where wells are the only sources of drinking water. There are 43 wells in all and widely distributed throughout the city. The concentration of the wells is mainly seen at Kirni ghat near the moat. The water table of the well surroundng the moat is hardly 10 feet.

Although industries are the major consumers of water. The overhead tank in the R.I.M.D.C. area is of lower capcity as compared to those in the other areas. It is because of the fact that it supplies water to smaller areas.

**Table 7-6**
**Overhead tanks in Bharatpur (1978)**

| Area of the tanks | Height | Water capacity |
|---|---|---|
| Atal bund area | 15 metres | 2 lakh gallons |
| Inside the fort | 20 metres | 3 lakh gallons |
| Industrial estate | 20 metres | 1 lakh gallons |
| R.M.I.D.C. | 20 metres | 1 lakh gallons |

Source: Water Works Department, Bharatpur, 1978.

As discussed in the preceding paragraph, the city has only four overhead tanks to supply water for whole of the city. Despite the best efforts of the department, many areas do not get water even for domestic purpose. The water supply system in Bharatpur city is not well developed. It has no uniformity in all part of the city. The shortage of water in the residential areas surrounding the Laxman mandir, Jama masjid and Kotwali is due mainly to dense popuation. Mostly households have their water taps just outside the houses at the height of 30 cms. It is due to low water pressure. The water shortage is bitterly felt in the upper floors. The supply of water became difficult and expensive in the higher areas as it requires heavy water pressure. Such problems are felt in Namak ka katla, Putpara mohalla and Girahi line. The water supply is not satisfactory in mohallas near Kumher gate, Baasan gate, Outer Kumher gate, Krishna colony, Rajendra nagar and Ranjeet nagar since they lie far away from the sources fo water supply.

The city can be divided into 4 zones and each zone has one high level service reservoir. Zones of water pipes are as follows;

1. City with Krishna colony
2. Ranjeet nagar
3. Industrial area and
4. R.M.I.D.C.

The first zone is densely pupulated and has two overhead tanks, one of 2 lakh gallons capacity at Atal bund gate and other one of one lakh gallons capacity inside the fort. In the second zone, there is separate water reservoir of 50 thousand gallons capacity. Zone third and fourth have seperate water supply system. Each of the zones has one high level underground water reservoir of two lakh gallons capacity. The third zone i.e. industrial estate has a separate overhead tank of one lakh gallons capacity of which 75 thousand gallons is required by the 'Cimmco' only and the reamining 25 thousand gallons water by the other industries. In zone four, also there is a separate overhead tank of one lakh gallons capacity. In the first two zones, the water is discharged only for two hours each in the mornings and in the evenings while in the other zones, water is supplied throughout the day and night. The city gets 21 lakh gallons water per day. The per capita water supply of the city comes to about 20 gallons a day which is ten times more than Bikaner city[5]. It shows a great variation of water supply in eastern and western most cities of Rajasthan. It is not much lower when compared with the per day per capita water supplies at Jaipur 24 gallons, Calcutta 31.5 gallons and Bombay 47 gallons[6].

It should be noted that the population of Bharatpur is increasing fast. Besides many visitors come to the city in large numbers at the time of Dashahara festival. Further, the domestic and transport animals, too have their share in this water. The industrial use of water is also increasing. Thus the average actual consumption of water becomes lower than indicated above. There are 90 public taps but working 60 taps only for the use of general public. On an average one tap is being used for every 1,500 persons. So the long queues of women waiting for their turn to get water from the public taps is a normal phenomena.

Pipe lines carefully designed and distributed to get the fullest benefit. The main pipe lines have designed in proportion to the flow of water. The existing system has been fed at a number of points by large diameter pipes. The supply mains start from a service reservoir and in the main streets of zone in order to feed the other distribution lines at certain points. The table below shows the diameters of water pipes, their lengths and distribution.

The water is supplied here from the Bund baretha, the headworks filter situated towards the south-west environs at a distance of 36.5 kms. from the city. The pipe lines running from Bund baretha to the overhead tank at, Atal bund gate, is of 24 inches of diameter.

The diameter of pipes inside the city wall are larger than outside. It is because of large numbers of connections within the walled city and highly dense populated area. The water supply must be distributed according to the density of population and their economic activities in the different parts of the city.

**Table 7-7**

**Pipe line system in Bharatpur, 1978.**

| Diameter of water pipes in inches | Length of the water pipe in kms. | Area |
|---|---|---|
| 2 inches | 9.00 kms. | Maximum in Ranjeet nagar |
| 3 " | 23.00 " | In walled city |
| 4 " | 9.00 " | " |
| 5 " | 6.80 " | " |
| 6 " | 2.65 " | " |
| 7 " | 0.60 " | " |
| 8 " | 5.66 " | Industrial area and R.M.I.D.C. |
| 9 " | 1.06 " | In the city |
| 10 " | 3.80 " | " |
| 12 " | 5.20 " | From head works to Malahe and Atalbund overhead water tank |
| 16 " | 5.90 " | Filter head works to fort over-head tank |
| 18 " | 0.03 " | Near Atalbund area. |

Source: Water Works Department, Bharatpur, 1978.

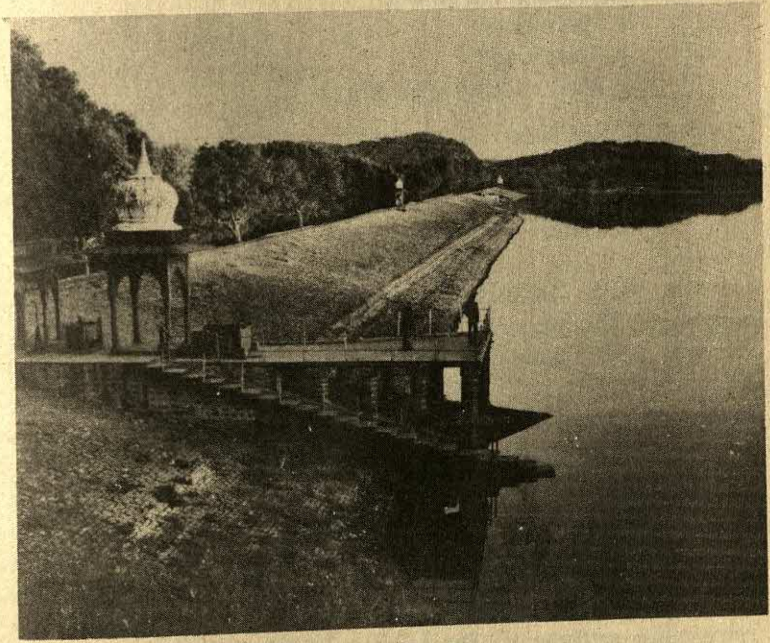
## Social Amenities In The City Environs

The following social amenities and infrastructural facilities are shown by composite index of scores.

**(1) Educational facilities**

a. Primary schools

b. Middle schools
c. High schools
d. Higher institutions or colleges



*6.1 Bund Baretha, a source of drinking water for Bharatpur city.*

**(2) Medical facilities**

a. Dispensaries
b. Family planning centres
c. Maternity and child welfare centre
d. Primary health centres
e. Hospitals

**(3) A. Infrastructural facilities**

a. Wells
b. Tanks

c. Others
d. Tubewells
e. Taps

**B. Electricity**

**C. Post and telegraph service**

a. Post offices
b. Telephones
c. Post and telegraphic offices

**D. Rail and roads**

a. Kachcha roads
b .Pacca roads
c. Trains

The above facilities or functions have been allotted some weightages. The analysis of the composite index for each settlement has been done to show the 'Settlement Hierarchy' by using the central place method (Appendix 6-B). The rank of a place depends upon the number of services which are found in its hinterland. A town serves its hinterland by providing the centralised services and functions.

There are two colleges in Bharatpur city. Thus the city serves as a centre of higher education. The higher secondary schools are located in the towns or large rural settlements whose average size of population is 2,232. The places with middle or high schools have been taken as central places because they provide an educational services for their surrounding settlements. The primary schools are fairly distributed throughout the environs (Fig. 7-2). The general and specialised hospitals of the higher order are located in Bharatpur city and in the large settlements whose average size of population is 1,998. These large settlements play an important role in serving their surrounding areas with such functions. The concentration of medical institutions is more towards the north. It is because of large size of settlements (Fig. 6-3). Postal service, telephone service, electricity and water supply are the important services for the development of an area. Postal services are offered by different post offices according to the needs of the people. Other facilities are not available in many villages due to lack of transport facilities.

Table 7-8 reveals that the whole environs has 9.35 mean scores of educational amenities, followed by medical facilities of 15.17 and

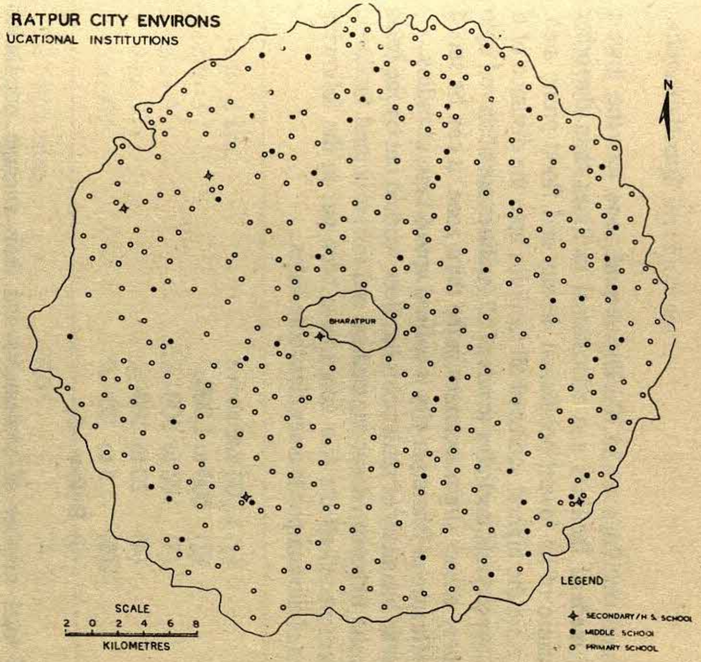
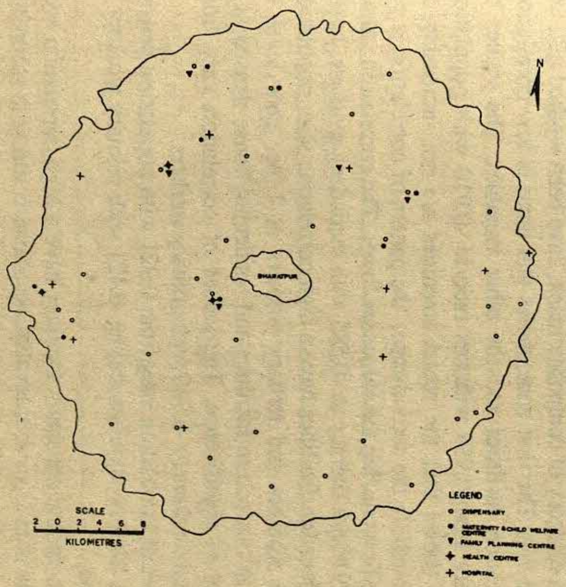


*Fig.* 7-2 Educational institutions, Bharatpur city environs



7-3 Medical institutions, Bharatpur city environs infrastructural facilities of 35.70. The second zone has the lowest scores of medical facilities and educational facilities than the other zones because of its lowest population density and flood prone area. Thus there are the highest scores of all facilities upto the distance of 6 kms. and beyond that declining trends of all facilities are observed upto the periphery except slight increases in the third zone. It can be stated that the influence of Bharatpur city is cofined upto 6 kms. of radius.

Here the hierarchy of settlements has been worked out on the basis of composite index of education, medical and infrastructural facilities. The settlements of all the four zones have been put in the following categories of the composite amenities score index.

(1) 1,000 and above
(2) 500 to 1,000
(3) 100 to 500
(4) 20 to 100
(5) 5 to 20
(6) Below 5

The total number of settlements and their average population falling in each category of composite index, have been worked out, are given in table 7-9. The first zone shows that there is low correlation between education facilities and the other variables. The values of correlation vary from 0.939 with sex ratio to -0.910 with population growth. This shows that the social amenities are not increasing as population growth. In the second zone, the pattern of correlation is the same as in the first one, but the values are lower. The correlation values vary from 0.791 with literacy to -0.585 with secondary workers. In the third zone, education facilities have a high correlation with population density, total workers and tertiary workers at 1 per cent level of significance. Infrastructure facilities and residential house density at 5 per cent level of significance. The values of correlation vary from 0.942 with total workers to -0.946 with primary workers.

The values of correlation vary from 0.921 with population density (at 1 per cent level of significance) to -0.421 with primary workers in the fourth zone.

In the whole, the education facilities have a high correlation with medical facilities at 1 per cent level of significance and with secondary workers at 5 per cent of level of significance. Correlation values vary from 0.997 with medical facilities to -0.898 with primary workers. In fact, there is a negative correlation between education facilities and primary workers.

### Table 7-8
### Means in each 10 sq. kms. area in different zones (Social Amenities)

| Distance | Education facilities composite score | Medical facilities composite score | Infrastructural facilities composite score |
|---|---|---|---|
| 1 to 2 km. | - | - | - |
| 2 to 3 " | 9.40 | - | 25.00 |
| 3 to 4" | 117.73 | - | 97.39 |
| 4 to 5 " | 2.91 | - | 62.80 |
| 5 to 6 " | 8.74 | 62.27 | 9.18 |
| Ist 6 km. zone | 20.63 | 34.55 | 37.16 |
| 6 to 7 km. | 1.68 | 2.80 | 9.93 |
| 7 to 8 " | 3.13 | 7.83 | 31.29 |
| 8 to 9 " | 9.49 | - | 46.35 |
| 9 to 10 " | 5.39 | - | 33.35 |
| 10 to 11 " | 4.65 | 19.78 | 71.57 |
| 11 to 12 " | 4.47 | 2.80 | 26.08 |
| IInd 6 km. zone | 4.69 | 6.09 | 35.25 |
| 12 to 13 km. | 3.31 | 20.14 | 34.35 |
| 13 to 14 " | 2.74 | - | 19.51 |
| 14 to 15 " | 18.63 | 44.96 | 95.83 |
| 15 to 16 " | 5.32 | - | 12.04 |
| 16 to 17 " | 7.84 | 1.54 | 24.30 |
| 17 to 18 " | 20.37 | 16.52 | 39.85 |
| IIIrd 6 km. zone | 11.02 | 17.00 | 43.00 |
| 18 to 19 km. | 6.53 | 3.30 | 11.28 |
| 19 to 20 " | 6.60 | 9.07 | 12.08 |

| | | | |
|---|---|---|---|
| 20 to 21 " | 7.75 | 15.19 | 27.47 |
| 21 to 22 " | 8.20 | 27.24 | 55.20 |
| 22 to 23 " | 5.08 | 21.53 | 15.50 |
| 23 to 24 " | 7.11 | 14.69 | 53.50 |
| IVth 6 km. zone | 8.74 | 15.47 | 29.11 |
| Environs | 9.35 | 15.17 | 35.70 |

The medical facilities and infrastructural facilities also have the same pattern in all the zones as the education facilities. These three variables are therefore, indicating a multicolinearily in character. The large size of settlements enjoy high education, medical and infrastructural facilities which have low sex ratio and sizeable primary workers.

**Table 7-9**

**Functional hierarchy in city environs**

| Class | Composite amenities score | Average population | Total number of settlements total 502 |
|---|---|---|---|
| Very high | 1,000 and above | 11,672 | 2 |
| | 500 to 1,000 | 2,880 | 2 |
| High | 100 to 500 | 2,433 | 12 |
| Medium | 20 to 100 | 1,443 | 93 |
| Low | 5 to 20 | 798 | 55 |
| | Less than 5 | 387 | 238 |

The above table reveals that the settlements with an average population of 11,672 have the higher composite amenities scores i.e. more than 1,000 while about 48 per cent settlements with an average population of 387 have the lowest amenities scores. (Table 7-9)

There are two settlements of the first hierarchical order (Fig. 7-4) i.e. Kumher in the north-western part and Fathepur Sikri in the south-eastern part at the distances of 13 and 23 kms. away from the Bharatpur city. Cultural landscape of Bharatpur city is the most important centre for economic, political and social development. It is also a regional headquarter for administration, law and justice, finance, transportation and communication. It acts as a powerful industrial and educational centre for the population since it has large scale industries and two colleges. Fatehpur Sikri and Kumher are also historical places.

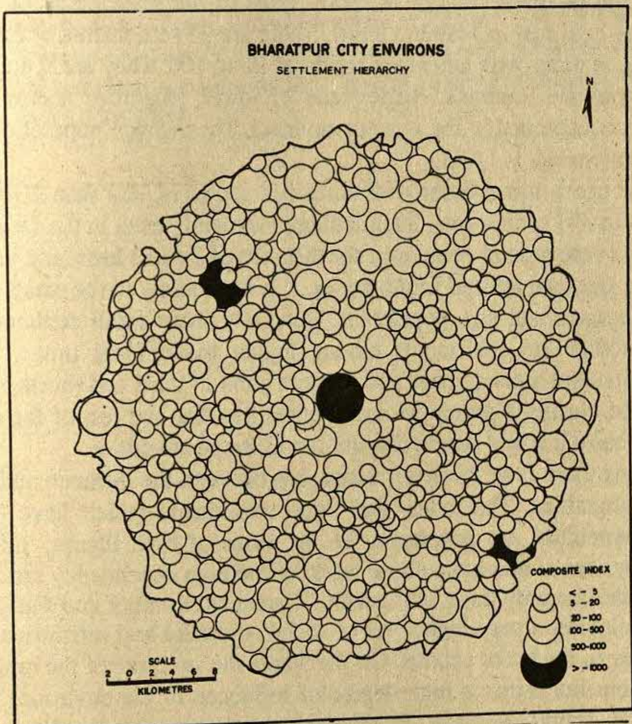


*Fig.* 7-4 Settlement hierarchy, Bharatpur city

These large settlements have large builtup areas with developed network of roads, and big marketing centres. There are two settlements, Sewar Kalan in the first zone and Korer in the fourth zone belonging to the second hierarchical order whose amenities scores range from 500 to 1,000. These settlements lie on the national and state highways. The average population of these two settlements is 2,880. Both these settlements situated at four or five kms. distance from important town centres.

There are 12 settlements of third hierachical order with amenities scores of 100 to 500. However, they may be observed towards the north-eastern enviorns in the third and fourth zones. The average population of these villages is 2,433. Most of the settlements of this order are confined in Mathura tehsil. There are 93 settlements of fourth hierachical order with amenities scores of 20 to 100. They are scattered throughout the environs. Settlements of lower amenities scores are mainly concentrated in the western environs. The average population of these settlements is 1,443.

The entire lower order with amenities scores of less than 20 may be seen in 393 settlements. Such settlements mainly exist in the form of clusters in the second zone from the distance of 7 to 12 kms. and in the western side in third and fourth zones. It is due mainly to the small size of settlements and thin population. Generally these small settlements exist around the settlements having higher hierarchical order. The entire first and second zones and western parts of third and fourth zone show the clustered pattern of social amenities than the rest of the area which has a low and sparse distribution of social amenities.

Thus there is an inverse relationship between the distance and the social amenities. The towns and large settlements which have high social amenities are developed, i.e. in terms of high literacy rate, a large number of non agricultural workers and high dependency ratio.

There are only three settlements, Bharatpur, Kumher and Fatehpur Sikri enjoying a very high level of social amenities and infrastructural facilities as the nodal centres. On the whole the structure of the ranking of settlements shows a high degree of influence in the environs. This situation shows a weak functional organisation among the rural settlements.

It is concluded that Bharatpur city has its influence upto the distance of 6 kms. only beyond which the settlements have low social amenities upto 12 kms. In the environs, only 2.78 per cent settlements have high level of social amenities. The towns and large settlements have a large number of centralised services. Thus the whole environs, except the large settlements and the towns, shows a poor development of the medical, educational and infrastructural facilities. For the development of the environs, it becomes essential that the basic social amenities should be provided.

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## 8

# DRAINAGE SYSTEM AND FLOOD HAZARD

Flood does not mean heavy rainfall. Sometimes it is observed that one place gets higher rainfall but there is no flood and the other place which receives lower rainfall may create flood[1]. In this way heavy rainfall is not the only factor which is responsible for flood. Drainage system of an area is an equally important factor as is the case of Bharatpur city and its environs. That minimum level of rainfall which touches and creates bad effects on the economic and other aspects of cultural landscape, may be termed as flood.

Bharatpur city is more intimately related with its environs than any other city of Rajasthan not only culturally but also physically. It is because topographically the city and its environs form a saucer-like plain, Bharatpur city being its centre[2]. May be that it is the lowest area of the State of Rajasthan. The result is that the three rivers, Ruprail, Banganga and Gambhir all nonperennial coming from its three bordering districts, Alwar, Jaipur and SwaiMadhopur respectively, have their flow from west to east steering towards this area. The first two form an inland drainage while the third flowing east meets the Yamuna. The Banganga and the Gambhir are relatively larger rivers than the Ruprail[3]. (Fig. 8-1)

A recent study of the landset imageries and aerial photographs of this area has revealed that the old channel of the Yamuna passes through the Bharatpur district[4]. Thus in the recent geological period there had been some slight upheaval due to which the Yamuna changed its course and left Bharatpur and its environs in a depression to suffer the consequences.

Since Bharatpur and its environs fall within semi-arid zone nothing untowards happens during the normal years of the monsoon. (Table 8-1) But if there is higher rainfall in the catchment of any of these rivers and that too continuously for more than 2-3 days, it creates floods and brings about havoc to Bharatpur city to which there is a general slope of the country from all the three directions-north, west and south. The only sluggish exit of water is in the east towards the Yamuna.

The hilly catchment area and seasonal nature of the rivers and the sandy alluvial nature of the soil in the environs, all these factors combined together and maintained an ecological balance in the region. The hilly terrain in their upper catchment brings heavy runoff in these rivers but it had been absorbed in the sandy soils. But with the lapse of time heavy discharge during the monsoons along with heavy siltation has resulted in considerable raising of river beds. So much so that generally the river beds coincide with the ground level and rivers become very shallow and wide. Thus the ecological balance has been disturbed in the whole of Bharatpur city and its environs. The site conditions have become such that even with the low discharge of 5,000 cusecs the water spreads over its banks and if proper marginal bunds are not provided it starts spreading in the nearby fields and villages. Thus there is always created a fear of flooding the nearby villages throughout the rainy season. Some villages are bound to be flooded every year because marginal bunds are not provided all along the river

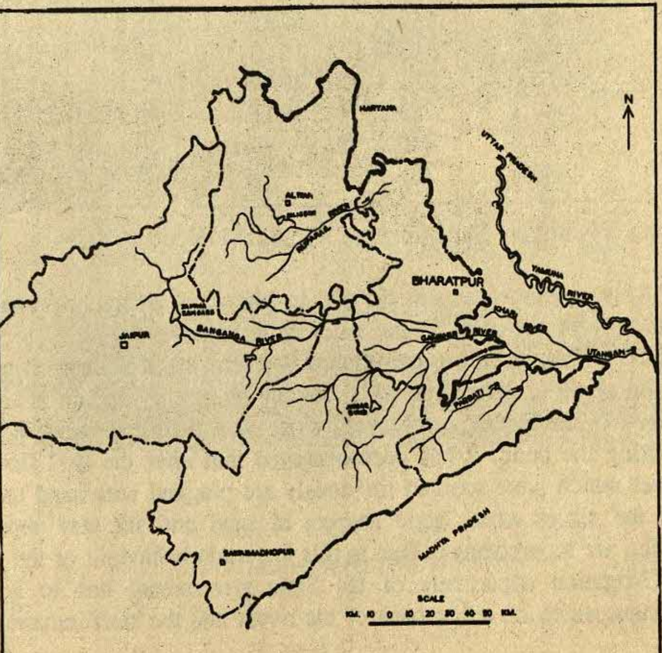


*Fig.* 8-1 Drainage system, Bharatpur city environs banks and the existing marginal bunds made of local sand and silt available in the river beds are washed away very easily with the current of the water even during the low discharge.

Since the rains are never normal but vary from year to year and from area to area, the behaviour of these rivers also becomes uncertain. With sudden heavy rains the discharge of these rivers increases and the rivers start flowing in full width restricted only with the help of marginal bunds on either banks.

**Table 8-1**
**Rainfall in the rainy days-Bharatpur**

(In mm.)

| Year | June | July | August | Sept. | Annual rainfall of rainy days |
|---|---|---|---|---|---|
| 1965 | 5.1 | 128.6 | 103.3 | 227.0 | 565.0 |
| 1972 | 9.1 | 149.0 | 324.7 | 83.9 | 576.6 |
| 1973 | 53.5 | 153.5 | 323.2 | 115.8 | 681.0 |
| 1974 | 46.3 | 363.9 | 151.1 | 36.3 | 621.0 |
| 1975 | 56.0 | 253.1 | 292.6 | 56.1 | 700.5 |
| 1976 | 141.1 | 223.8 | 309.6 | 45.5 | 775.0 |
| 1977 | 47.4 | 310.9 | 307.6 | - | 948.0 |
| 1978 | 66.2 | 288.4 | 155.2 | 108.0 | 589.9 |

Source: Hydrology Department of Rajasthan, Jaipur. 1979.

This condition remains for two to four days, depending upon the continuity of the rains in the catchment area. As the rain stops the discharge starts reducing and ultimately it remains in a shape of narrow stream of 15 to 30 metres wide flowing sluggishly and in a zig-zag course. If the stream comes very close to a marginal bund, it starts scouring the bund. It has been observed that after the first flow the places which were scoured previously are plugged with sand and slit and the places where good amount of sand and silt was deposited earlier, are scoured anew. Due to this uncertain behaviour of the rivers the Irrigation department of the State government has to keep a constant watch on either bank of the rivers and the staff remains very busy and worried in ;protecting the marginal bunds and diverting the course of the rivers (in low discharge conditions) by providing temporary spurs, etc., made of wooden ballies, bamboos, and earth filled G.C. bags. It is in this way that the man and the nature are in constant struggle of co-existence.

Although flood havoc have been for a long time in Bharatpur and its environs, we can recall only those which wrought havoc since 1958. The flood of 1958 was the first flood after the integration of the Indian states in Rajasthan. After that the situation of flooding around Bharatpur was created in 1960, 1962, 1964, 1967, 1969, 1972, 1974, 1975, 1977 and 1978. That is, Bharatpur has been in the grip of floods either every year or at least every alternate year. Some of the floods

*7.1 Flood water in Harizan Colony, Bharatpur 1972.*

were of serious nature. For example, the floods of 1972 are said to be the worst ever experienced in Bharatpur. During this year the floods came simultaneously in all the three rivers after breaching various bunds.

In order to get relief from the fury of the nature the people of this area have tried to contain the floods under control by several devices both in Bharatpur city and its environs.

It was the great ingenuity of the Jat rulers of Bharatpur that the capital of the state being in a depressed area instead being on a mound or a hillock like most of the cities. they dug a moat around the fort and another moat around the city[5]. From the earth dug out of the outer moat they built a mud wall around the city all along the moat with a number of city gates for intercommunication. Both the moats and the walls not only contained the water of the floods but checked the enemies from entering into the city. The mud fortification of Bharatpur is well known in the history of the Mughals and the Britishers whose bombs from the cannons could not penetrate the mudwalls.

The inner moat could contain only a portion of the flood water. Whenever there were great floods in any of these rivers or simultaneous floods in any two or all the three rivers, the inner moat-itself used to be flooded. So the outer moat was dug out to mitigate the fury of the increasing number of floods in Bharatpur city and its environs.

Like the Bharatpur city, its environs with flat plains and many depressions has also been witnessing the havocs of the floods and the history of Bharatpur and Dholpur mentions about their rulers who had built hundreds of bunds and dams with the help of the English people in order to control floods and to irrigate extensive cultivated areas. Sikri bund, Baretha bund, Ajan bund, Sewer bund, etc., were built during the reign of Maharaja Jaswant Singh. During the same period big dams were built on the small nallahs coming down from the hilly tracts of the states. By 1904, it is learnt that within the Bharatpur state alone there were 244 small and big dams. This not only speaks about the flood havocs in the region at that time but also the ingenuity of the engineers to utilise their waters for irrigation purposes for a long time.

**Ruprail System** :- The Ruprail system has the following drainage system:

(a) Ujjina drain, Kama Pahari drain and Goverdhan drain complex.

(b) Homes canal.

The Ruprail river originates from the Thanagazi hills, flows through the Alwar district and terminates at Sikri bund. It is sometimes responsible for creating floods in Bharatpur. At Barahweir 20 kilometers uspstream from Alwar this river bifuractes into two parts. The left side goes to Alwar and the right side leads to Sikri bund system in the Bharatpur district. In Alwar state two reservoirs Siliserh and Jaisamand with storage capacity of 13.93 M.Cum and 25.54 M.Cum were constructed on this river since the local catchment of Jaisamand is not sufficient Barah pick-up-weir was constructed on the main river about 19.33 Km. from Alwar which a feeder channel takes off to feed the Jaisamand tank. The Barah pick-up-weir is proportional regulator and divides the flood waters in the ratio of 1:1:234 between Alwar and Bharatpur. The Sikri bund is 22.40 Kms. long and it consists of 26 regulators for canals to inudate and irrigate down stream fields. The F.T.L. is 11 feet. The normal flood water can be absorbed in the inundation of the system but when the flood in the Ruprail is abnormal and cannot be absorbed in the above system it starts flowing towards the Seh bund and the Motijhil towards west and north of Bharatpur city. It is now regulated through the Homes canal which is link channel of 100 cusecs of discharge to feed the Seh, Borai, Bhandor and Motijhil bunds from Sikri bund. Whenever Ruprail is in heavy floods continuously for 2-3 days, maximum water reaches the Sikri bund and further the Motijhil through the Homes canal over flanking its banks[6].

The Ruprail system has been designed to drain the low lying areas in Haryana, Rajasthan and U.P. The stormy run off of the Landoha nallah of Bharatpur, Nuh-Ujjina area of Haryana and Kama-Pahari area of Rajasthan used to overflow usually during high rainfall years into the adjoining areas and ultimately drain out as sheet flow through low lying belts of Mathura and Agra in U.P. Thus the flood water used to be dispossed off to the Yamuna river through western depression drain and the Khari river in Agra district. The water used to drain out very slowly upto March and some of the depressions were never dry. Thus even the rabi crops were not sown. In order to channelise this sheet-flow to avoid the recurring damage, an inter-state drainage scheme was conceived with the concurrence of the three concerning states Haryana, Rajasthan and U.P. started in early sixties. The Kama-Pahari drain starts from Khaluka regulator on the Rajasthan-Haryana border and after traversing a distance of about 32 kms. entres into U.P. to form 80 kms. long Goverdhan drain, 16 kms. of which passes through the Rajasthan State.

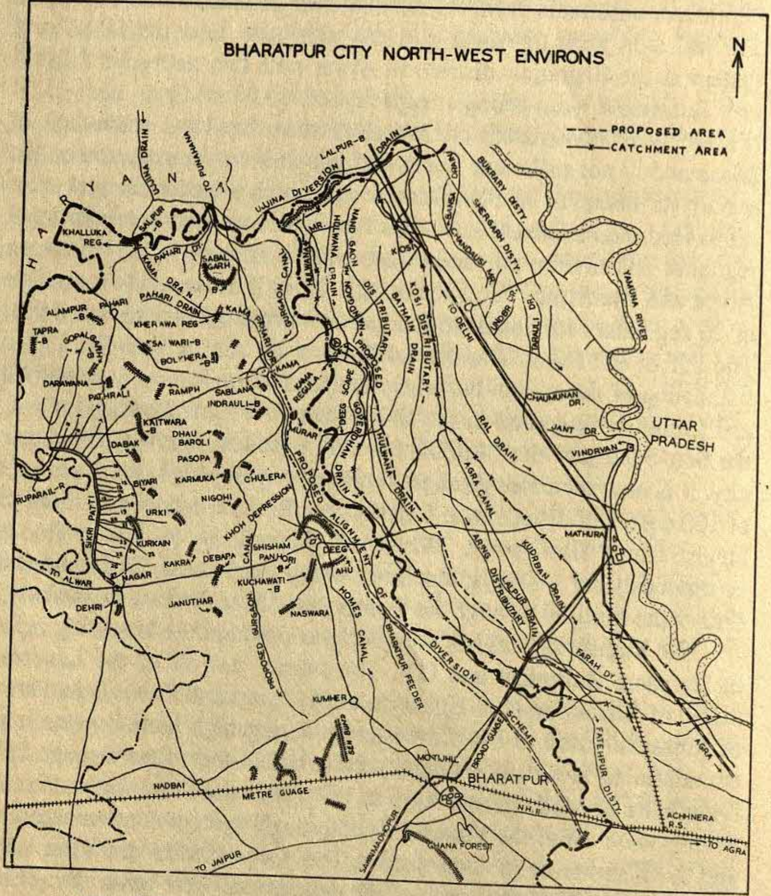


*Fig.* 8-2 Integrated flood drainage schemes of Kama Pahari area

There is a case for increasing the discharge capacity of Kama-Pahari drain and Goverdhan drain by increasing their widths and lowering their beds to accommodate the realistic catchement as well as to drain off the entire water impounded in 19 depressions in Kama tehsil.

During 1977, unlimited foods entered into Kama tehsil due to artificial cuts made in Salpur bund and the right bank of Pahari distributary. This was checked subsequently by raising their bunds by 1.83 metres and by effective and strict watch and ward by the Rajasthan armed constabulary and the departmental staff during the rainy season of 1978. The chances of floods from Haryana would recede by the construction of Ujjina diversion drain directly outfalling into the Yamuna.

Sikri bund is primarily a diversion bund to divert the flow of water through 26 inundation canals which irrigate about 16,187.44 hectares. The flood water of the Sikri bund is partly dispossed off through the Kama Pahari drain system and the rest via Motijhil through the Homes canal.

Homes canal originates from Kho depression and before discharging into Motijhil passes through the three depressions namely Kho, Ahu and Pangora with a total water spread of 7714 Hactares. It passes through Gharbari, Sisham, Ahu, Seh, Borai, Bhandore and Motijhil bunds. From Motijhil the water is drained out to Chiksana bund through the Girraj canal and the escape drain. The Homes canal was constructed by captain Homes, R.C., in 1867 and was improved by the State P.W.D. in 1903.04 and 1907-1908. The main purpose of this canal was to drain off the water between Deeg and Bharatpur and to feed the intervening tanks.

The length of the canal from Sisham bund to Motijhil is 34.60 kms. The Homes canal was lying neglected and un-attended till March, 1978. With the result the three depressions on the way remained only partially full even during the rabi season and nothing could be grown. Its capacity was increased from 4.25 cumecs to 5.66 cumecs during May to June, 78 by desilting, deepening and widening. Thus Kho depression which was ever depleted in totality even by March was completely dry by the middle of November and the water spread in Ahu and Pangora came down to about 121.41 hectares. This canal can be remodelled for about 9.02 cumecs to maintain a continuous flow of 1.98 cumecs of water of the Ruprail to be confined within channel without any water spread on either side. This is possible by giving a steeper gradient upto Motijhil regulator.

The surplus water coming from the canals of Sikri bund to the tune of 1.41-1.98 cumecs can be tapped before finding its entry into Kho depression and utilised through the tail minor of the Gurgaon canal from where irrigation during rabi season may be possible.

At present an utilized water of Ruprail river goes waste and creates a food problem in Alwar and Bharatpur districts. After a storage tank is constructed 30 kms. upstream from Alwar it will result in flood moderation and increased irrigation in both the districts.

### Banganga System

Banganga is also a non-perennial river which originates in Jaipur district about 64 km. up stream of Jamua Ramgarh bund. After flowing 241.5 km. in Jaipur, Alwar, Sawai Modhpur and Bharatpur districts it terminates at Nekpur headwork from where the entire water of the river is diverted into Uchain canal. It enters Bharatpur district near village Kamalpura and flows for about 56 km. in Bharatpur district before entering U.P. The important tributaries of this river are Gomti and Suri. The utilization of water potential in its basin always received the consideration of ex-rulers of the riparian states. In Jaipur and Alwar a number of tanks have been constructed on this river while in Bharatpur 9 canals namely Rama Swami canal, Lalpur canal, Nekpur feeder, Pathena canal, Lalita Mudia canal, the Dharsooni canal, Attari channel and Uchain canal (a continuation of Banganga) were taken off to feed a large number of tanks constructed in series for inundation irrigation by spreading as a sheet of water. All these tanks are depleted latest by the end of September every year and the mositure retained by the soil is sufficient to raise and nurture and rabi crops. Sixty seven tanks are fed by different canals.

### Behaviour and Problems of The Banganga

In 1967 flood of the Banganga river over topped its left and right banks up stream village Kherli Gujar about 1.61 km from Halena village. The sheet of water which travelled towards Bharatpur along the national highway caused damages to intervening tanks and villages. This water ultimately found its entry into Murwara and Addi bunds and Ajan canal had to be run to carry over discharge than it is designed for. It was grazing almost along the top of its banks. This situation was aggravated as Ruprail river also got flooded simultaneously. It over topped and washed away Ajan canal near the aqueduct. Motijhil thus go enormous inflow which was beyond the discharging capacity of the Girraj canals. This resulted in rapid rise of water level in the Motijhil. In order to save Motijhil and thus the city of Bharatpur, Bharatpur-Mathura road had to be cut near the industrial area. Though it saved Motijhil, but in turn the entire industrial area including 'Simmco' factory and the Agra-Mathura metre guage railway line were flooded. Girraj canal also ran beyond its designed capacity. The maximum discharge received in the Motijhil was estimated to be about 81.55 cumecs (a) through the aqueduct of Homes canal under Ajan canal, (b) through the two breaches in the Ajan canal, and (c) through the two regulators in Ajan canal.

## Flood of 1972

The high discharge at Maloni bridge in 1972 breached the upstream side of Lalpur head near Rahimgarh village and uncontrolled floods of the river went into Lalpur bund. A large number of bunds were breached both up and down streams of the river which breached itself upstream of Maloni bridge. The over-flanking of Banganga river on its right side between Chhokarwara and Awoli resulted in excessive inflow into Ataripura bund which also breached due to over topping Pathena canal was run with more than its full capacity and it over topped at several points as a result of which Khadraya bund, Newara bund Dhesina bund had breached.

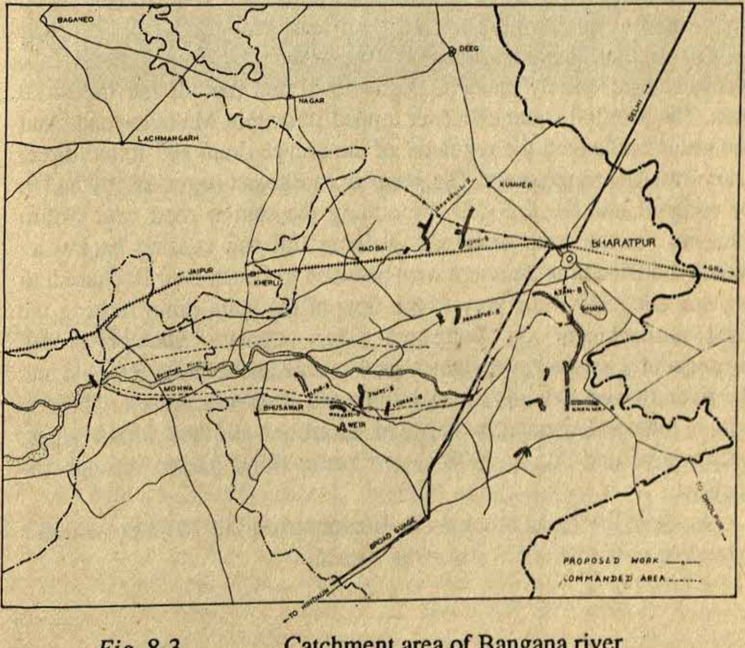
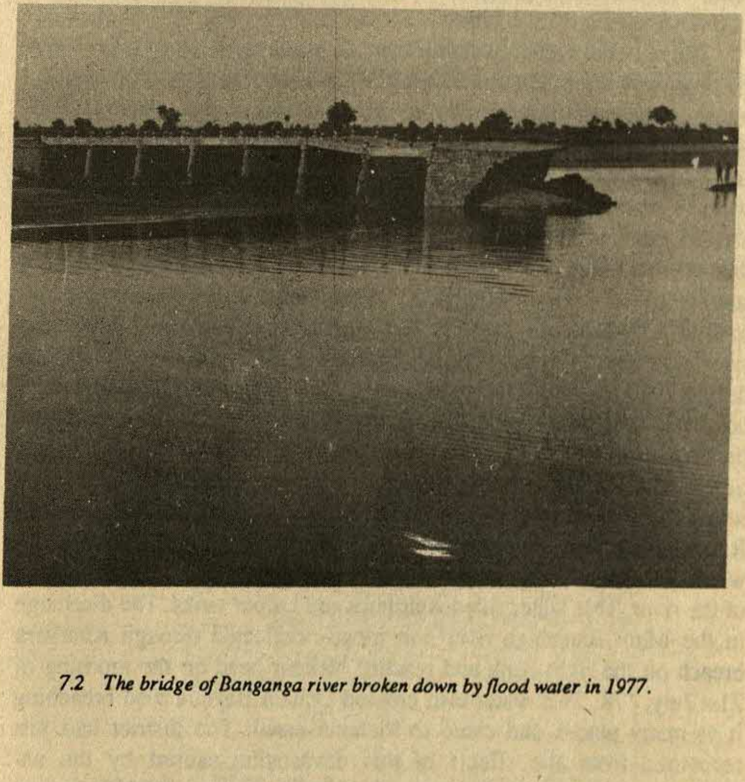


*Fig.* 8-3 Catchment area of Bangana river

### Flood of 1977

Although the discharge in the year 1977 was only 396.42 cumecs, the left side marginal embankment near village Mandir gave way on 31st July, 1977. Almost the entire river got diverted towards Hantra and Dehra bunds flooding Nadbai and Kumher Tehsils. Uncontrolled floods found their way into lower Sewar and Murwara bunds after damaging Bharatpur Jaipur national highway at many places. Most of the water which went across the national highway rushed towards Kumher and damaged the intervening tanks and rushed towards Motijhil via Seh, Berau and Bhandora bunds. Motijhil was thus subjected to two proper attacks i.e. from Bhandora bund and through Addi bund via Ajan canal. Murwara bund was cut by the villagers on 3rd August, 1977 and the flood water subsequently overtopped the Broad guage railway line between Sewar and Bharatpur Station breaching the Ajan canal and flooding the Ranjeet nagar colony. The cut in Murwara bund was restored on the same day with the help of the police. But the villagers of Murwara again cut the tank after manhandling the officials of irrigation department and the police helplessly watched the aggressive approach of the villagers. The Bharatpur city thus faced the pathetic situation. The situation was aggravated when Motijhil was also cut near Motijhil Kothi and near village Taulpur by the villagers. The water also found access into Ranjeet nagar colony and F.C.I. gowdown and part of the industrial area. The Motijhil water also over topped Bharatpur Mathura road. And the water outflanked the regulator of the escape drain and found direct entry into the escape drain. The water from Ranjeet nagar colony had to be escaped into the C.F.C.D. by cutting the station road near Nehru Bhawan. As the main drain was running full and causing backwater effect, the Bharatpur Achnera road had also to be cut near Bachamdi to provide adequate water way to the flow of the main drain lacking the right embankment on Banganga river opposite Mandor breach subsequently washed away which gave immediate relief to left side and the river flowed towards the right side via Kharbora breach. There is now a channel formation between Kharbora and the broad guage railway line and during 1978 almost entire flood passed through the channel.

In short the flood situation in Bharatpur during 1977 presented a grim picture of chaos and misery all round.



*7.2 The bridge of Banganga river broken down by flood water in 1977.*

## Floods of 1978

The discharge brought by the river Banganga during 1978 was maximum during the living memory of the villagers except in 1924. The discharge in the river near the head of the Pathena canal was about 1274.22 cumecs (45,000 cusecs) and on the Maloni bridge about 991.06 cumecs (35,000 cusecs). The river out-flanked the left bank up stream of Maloni bridge between the national highway and Patehena canal. It was on the morning of 20th July, '78 that the gates of Ramgarh bund near Jaipur were opened due to heavy precipitation in the catchment area. A discharge of about 566.32 cumecs (20,000 cusecs) was released through the watte weir and gates of the Ramgarh bund. The maximum guage at Maloni causeway was 3.05 m. (10') at 2.00 A.M. on 22nd July, '78.

The national highway authorities had plugged 14 out of 69 vents of the cuaseway after the monsoons of 1977 which was also a contributary factor in the over-flanking of the river. The rest of the openings were choked with silt. The flood waters rushed between national highway and Pathena canal from west to east i.e. towards Bharatpur city. This sheet of water ran in many streams, the total approximate width being about 1 km. and average depth 0.60 m. (2'). This sheet of water caused damages to tanks and canals and villages on way. The over-flanking started at 9.00 P.M. on 20th July, '78 and water crossed Dehra Nadbai road at 4.00 P.M. on 21.7.78. The discharge which over-flanked the river was approximately 283.16 cumecs (10,000 cusecs). The floods during 1977 and 1978 followed almost the same route. The difference, however, was that during 1977, most of the water flowed almost parallel and close to the natioanl highway filling upper Sewar, lower Sewar and Murwara bunds, whereas during the year 1978, the bulk of water crossed the metreguage railway line and filled the tanks namely Raisis, Bhatawali, Dhaneara-Ajau-Pahua, Helak Roondh, etc. Some water also found access to village Chhokerwada due to over-flanking of the river. This water filled Ataripura and Lalpur tanks. The discharge in the Main Banganga river was mostly deflected through Kharbera breach on the right bank and reached Nekpur head on the morning of 21st July, '78. This water also crossed Uchain-Bayana road breadhing it at many places and came to Pichuna canal. The district had just recovered from the effects of this devastation caused by the unprecedented floods to the tune of 1274.22 cumecs (45,000 cusecs) whence heavy precipitation in the catchment area between Bharatpur and Jaipur again brought floods in September 1978. The pattern of disposal of floods was almost the same. The floods of 1978 breached 22 tanks and 13 canals whereas the number of damaged tanks and canals was about 48. The total budget requirement for damaged works during the floods of 1978 was about Rs. 65 lacs. The national highway also got washed away in a length of about 91.44 m. (350') adjoining the Maloni bridge.

After observing the floods of 1967 when vast devastation took place in and around Bharatpur, it was thought advisable to construct marginal embankments along Banganga river and the work was consequently commenced in 1969. This work was done in patches and continued till 1977-78.

**River Training Works Proposed During 1976**

A comprehensive project estimate for river training works on Banganga river in Bharatpur district was framed for an estimated cost of Rs. 227.67 lacs by the Executive Engineer, Irrigation Division, Bharatpur and was submitted to the Central water commission, New Delhi and the Ganga Flood Control Commission, Patna by the Chief Engineer, Irrigation Rajasthan, jaipur. The broad proposals contained therein were as follows:-

1. Construction of marginal embankments on the left and right banks of the river from Pathena canal head to railway crossing.

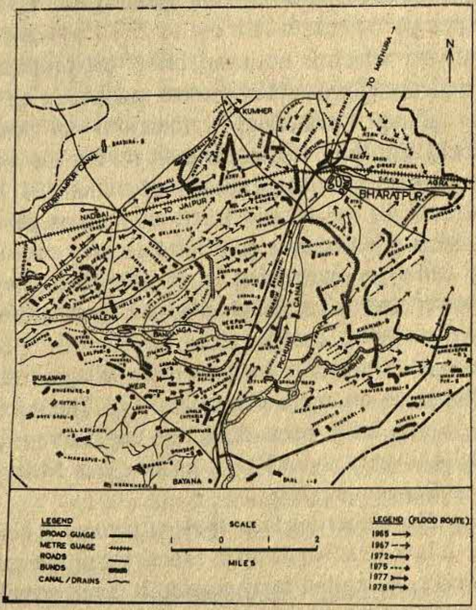


*Fig*. 8-4 Floods routes in different years for Bharatpur city

2. Excavation of a cuneate channel in the centre of the river from the off-take point of Lalita Mundia canal to Nekpur in a distance of about 3 km. since river course had been completely choked due to silt deposition in patches along the above reach.

3. Providing escape weir in Pichuna canal on up stream of Uchain canal to discharge off the extra supplies received from Banganga system.

The normal irrigation from Banganga system in Bharatpur district is 27113.96 hectares. In case the same is replaced by flow-irrigation by constructing a storage reservoir, the quantity of water required at 114.33 hectares per M.cum works out to 237.15 M.cum. (8375 Mcft) for a normal year which is not available at the proposed dam site at Todana. Complete replacement of present inundation by flow irrigation designed for giving 4 waterings is therefore not possible. Storage reservoir would help in flood moderation during the years of excess rainfall for creating a storage capacity of about 104 M.cum. (3690 Mcft.) This reservoir can be filled and emptied as per requirements. The flood waters released in a controlled manner can continue to fill the existing tanks for inundation as is prevalent today. The canals which will be constructed on either side for flow irrigation can be used for irrigation during rabi season.

There is a site for such a reservoir near village Todana in district Sawai Madhopur on the main Banganga river. The necessary surveys for the headworks have been done by the Survey Division. The proposed site is situated about 10 km. up stream of Mahuwa Mandawar road bridge on Banganga river.

Providing all weather roads on these structures is necessary and in their absence it is a great handicap in exercising proper control on most vulnerable works during the rainy season. It is not possible to run any vehicle or truck on the embankments when the top surface becomes wet. Wherever it becomes possible to supply electricity it would be advisable to provide electric points at all regulators and other vulnerable roads for proper lighting of the area. These three roads will cost about Rs. 10 lacs and will include strengthening of present sections to accommodate the road in the top and spreading gravel, quarry rubbish or murum whichever is most feasible and cheap.

The problem of silting in the course of the river will continue even after the construction of the storage dam and the safe discharging capacity of the river may be subjected to over-flanking in times to come. The situation can, therefore, be stabilized only by the heavy afforestation in the catchment area and adopting other soil conservation methods.

Gambhir originates from Karauli hills in district Sawai Madhopur where it flows for 80 km. After flowing through the plains of Bayana and Rupbas Tehsils of Bharatpur District it enters into U.P. where it is known as Utangan river and ultimately falls into Yamuna river. Bharatpur State constructed important tanks, several off-taking channels and the present government has also started work in Panchna Project. The total number of tanks directly fed by Ghambir system is 27 and 49 tanks, excluding the tanks of Panchayat Sammities ared fed by nallahs within its catchment area.

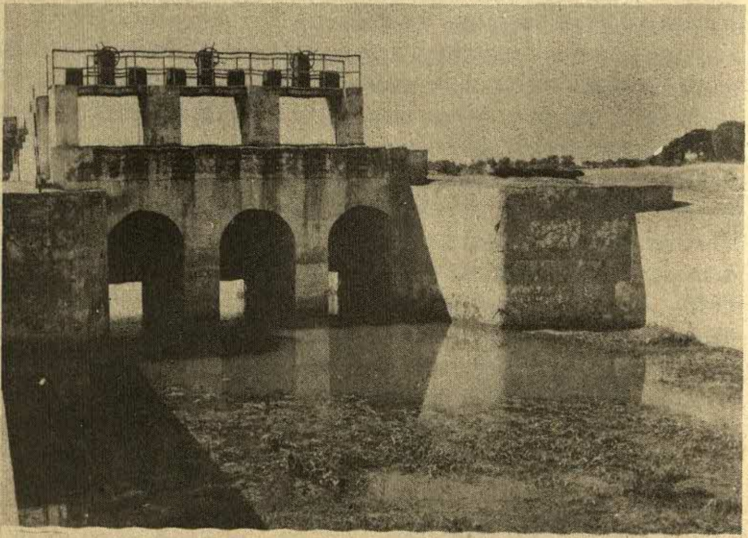
The Gambhir river brings large quantities of silt which is deposited along the entire course of the river when the flood recedes. In the 1972 flood which was more severe than that of the 1924, about 500 villages were submerged and 5,000 houses were washed away. A vast arrea was under water and 31 irrigation tanks and canals were breached. Most of important irrigation works like the Ajan canal, Girraj canal, C.F.C.D., Chiksana canal, etc. were damaged. The Bharatput city was surrounded with water from almost all the sides. In 1975 flood even the roads-rail traffic was badly dislocated. Since the flood of 1967 marginal embankments and spurs were constructed to keep the flow away from the villages, and feeding channels were opened to feed the tanks.

The department of irrigation has prepared a comprehensive project for river training work on the Gambhir river in the Bharatpur district at an estimated cost of Rs.190 lakh. It provides a storage tank upstream of Bayana town so that the floods may be moderated and stored water may be used for flow irrigation.

Whenever the Gambhir river swells the water strikes the right bank of the Kurka feeder and breaches it. Thus entire water rushes in an unregulated manner into Kurka bund which cannot sustain so much load, and gets invariably breached. Once it gives way there is no check of its flow into the upper Ajan bund. This is highly damaging. It is, therefore, essential to widen and strengthen the 13 km long right bank of the Kurka feeder by grouted pitching.

## Drainage Around Bharatpur City

The city of Bharatpur is located in a low pocket and has saucerlike shape. The fortification around it consists of a huge mud-wall and a formidable moat affording protection to the garrison and the people inside the city. The solid masonary fort is also surrounded by another deep ditch called inner moat. This type of fortification was required for a town located in the depression and mud walls constructed proved impregnable against repeated attacks. The town is located in flat plains having a very gentle slop from west to east. The elevation of the town varies from about RL 565.00 to 580.00. The water of Ruprail, Banganga and part of Gambhir systems ultimately finds access into Motijhil and Ajan bund after flowing through a series of bunds constructed upstreams. The water impounded in Ajan bund is released through many sluices on the eastern side towards U.P. whereas water from Motijhil used to be released through Girraj canal into Chiksana bund via Noh bund.



*7.3 Motijhil head at Girraj Canal*

The outer moat used to get filled in from the Ajan bund, water of the city and surrounding areas and Motijhil through Jhula minor. The lowest invert level of the city drainage is RL 561.50 and water flows to the adjacent area when the water level in the outer moat goes beyond this level. It enters into the city near Chandpole gate and attains a maximum RL of 570.00. This creates flooding of an area of about 4.05 hectares inside the outer mud-wall near the General Post Office. With the lapse of time the outer moat has got silted up and most of the area has been reclaimed for cultivation thus reducing the capacity of the moat which used to absorb the floods to a great extent. The surplus water of the moat flows out across the circular road near Jaghina gate and used to flow in sheet towards the out-fall of Girraj canal and causing heading up of levels. The surrounding of the city were thus submerged under water till the water level came down in Chiksana tank. In order to explore a suitable solution to this problem Dr. K.L. Rao, Union Minister for Irrigation and Power paid a visit to the city on March 1964 and it was decided by him to channelise the flow from Jaghina gates to Chiksana tank joining Girraj canal on way and demolishing Noh bund and lowering the Chiksana tank from RL 562.50 to RL 557.00 with removable wooden shutters on the top of over-flow section to raise the water level in Chiksana bund upto RL

*7.4 A view of flood water out of the Mathura gate 1977.*

560.00 to allow inundation irrigation from the discharges received from the tanks above after passing the peak floods. This Scheme was mostly completed by 1967 as provided for in the project report except construction of one bridge near Kumher gate and deepening of the outer moat due to land acquisition problems and difficulty in excavation.

There was a review of the whole situation after the severe floods of 1967 when Bharatpur town was seriously threatended by floods due to heavy discharges in Banganga and Ruprail rivers. Since the exit of water through MotiJhil was limited only through Girraj canal, the water

*7.5 Flood water cut down the Bharatpur - Agra road in 1972.*

had to be disposed off during monsoons of 1967 after cutting Bharatpur Mathura road near industrial area and cutting Bharatpur-Agra road near village Bachamdi adjacent to the district road bridge.

The water which flowed across Bharatpur-Mathura road submerged the industrial area including wagon factory and over topped the metre-guage railway line between Bharatpur and Chiksana. It was then realised that discharging capacity of Motijhil should be of the order of 85 cumecs with an additional outfall channel from Motijhil with a capacity of 57 cumecs depending upon observations made during the floods of 1967. The problem was discussed by Dr. K.L.Rao at Bharatpur soon after the floods of 1967 and in a meeting of state technical advisory committee on 12th January, 1968, following decision were taken on 20th February 1968.

*7.6 Construction and protection works in process near Molijhil head at Girraj Canal.*

| | Works proposed | Estimated cost |
|---|---|---|
| 1. | Constructing the Escape drain from Motijhil with a capacity of 57 cumecs. | Rs. 27,74,500 |
| 2. | Increasing capacity of flood control drain from Ch.310 to 570. | Rs. 13,46,200 |
| 3. | Constructing bridge across Bharatpur Agra National Highway. | Rs. 3,92,300 |
| 4. | Construction of a protection bund for Bharatpur-Mathura road. | Rs. 92,300 |
| 5. | Increasing the surplussing capacity of Chiksana bund. | Rs. 4,39,900 |
| | | Total Rs. 50,45,200 |

The estimate of Escape drain with a carrying capacity of 57 cumecs amounting to Rs. 33 lakh including the provisions of two railway crossings on Delhi Bombay broadguage and Jaipur Agra metre guage lines was finalised in July 1968.

The system as partly completed had the following draw backs:

1. An Integrated Scheme for the escape drain to carry 57 cumecs from Motijhil to the outfall at Khari river was not prepared with respect to heading up on account of high F.R.L. in the submergence of Chiksana bund.

2. The storage capacity of the outer moat was not restored after doing proper excavation.

3. Due to high level in the C.F.C.D. the city inlets did not function adequately necessitating lowering of the outfall level and deepening of the outer moat of the drain.

4. The escape drain was ineffective for want of construction of the two railway bridges.

5. The widening of the drain from Ch. 120 to Ch. 206 was not included in the original estimate.

6. The discharging capacity of Girraj canal is only 17 cumecs and its further widening or remodelling of the structures is not possible as it passes through populated area. As such the capacity of the escape drain had to be correspondingly increased from 57 cumecs to 68 cumecs so that the total discharge from the MotiJhil is of the order of 85 cumecs. Due to paucity of funds much work could not be done as approved by the state Flood Control Board.

The Scheme was once again reviewed by the Chief Engineer. Floods, Central Water and Power Commission and Dr. K.L.Rao, Union Minister for Irrigation and Power in 1971.

The proposals finalised during 1976 comprised of draining off all the surplus water of Bharatpur and its surroundings and to deplete all the low pockets and its safe disposal without causing any damage on way. After observations of the monsoons and assessment of floods witnessed during 1977 the discharge figures were again revised and subsequently approved by the Chief Engineer Irrigation Rajasthan, Jaipur. The figures of discharges as incorporated in different projects reports is shown below :-

| | | 1964 | 1968 | 1976 | 1977 | |
|---|---|---|---|---|---|---|
| 1. | Escape drain | - | 57 | 68 | 102 | (In cumecs) |
| 2. | Girraj Canal | 28 | 28 | 17 | 23 | |
| 3. | C.F.C.D. | 11 | 11 | 11 | 11 | |
| 4. | Ranjeet Nagar drain | - | - | - | 34 | |
| | Total: | 39 | 96 | 96 | 170 | |

The latest proposals were incorporated after seeing the floods of 1977 as mentioned above. The cost of the new proposal works out to about Rs.235 lakh as against Rs.298 provided in the revised project estimate of 1976.

The yearwise expenditure on C.F.C.D. main drain complex is given below :-

| S.No. | Year | Expenditure |
|---|---|---|
| 1. | 1964-65 | 2,68,020 |
| 2. | 1965-66 | 7,64,486 |
| 3. | 1966-67 | 4,52,263 |
| 4. | 1967-68 | 3,20,296 |
| 5. | 1968-69 | 15,74,264 |
| 6. | 1969-70 | 12,48,281 |
| 7. | 1970-71 | 7,31,228 |
| 8. | 1971-72 | 49,207 |
| 9. | 1972-73 | 3,83,012 |
| 10. | 1973-74 | 7,09,266 |
| 11. | 1974-75 | 18,57,696 |
| 12. | 1975-76 | 5,21,020 |
| 13. | 1976-77 | 25,78,135 |
| 14. | 1977-78 | 23,40,066 |
| 15. | 1978-79 | 40,41,600 |
|  | Total: | Rs.1,81,26,041 |

Source: Flood Department of Bharatpur, 1979

### Ranjit Nagar Drain

The present Ranjeet nagar colony is situated in a low depression and there is no exit for the water when the area is inundated by breaches in Motijhil or Ajan canal as happened in 1967 and 1977 or by local incessant rains. During the visit of central government study team after the monsoon of 1977, it was stressed that this accumulated water should be confined in a drain and disposed off suitably. This drain was designed for 8.50 cumecs or equal to the discharge of the Ajan canal and called the Ranjeet nagar drain which is under construction. It will cost about Rs. 25 lakh.

### Regulation of Flood Through Tanks

As already narrated in the preceding pages most of the land in Bharatpur district gets flooded by three rivers, the Banganga, Gambhir and Ruprail. Banganga and Gambhir feed many tanks through various canal systems as described earlier. There are 67 tanks on the Banganga system which get directly fed by canals off-taking from the river. Similarly 27 tanks are directly fed by river Gambhir. The rest are fed by local nallahs within the catchment of these rivers and pose no problem during regulation.

As regards Ruprail system theres is one big diversion dam known as Sikri bund. There are 20 tanks which get fed by 6 canals taking off from Sikri bund. These canals discharge water either in the catchment of the Kama Pahari drain or Homes canal. Basin-wise details of tanks are given hereunder :-

| **Particulars** | **No. of tanks directly fed by the three rivers** | **No. of tanks fed by local catchment areas within basin** | **No. of tanks outside the 3 basins** | **Total number of tanks** |
|---|---|---|---|---|
| Banganga basin | 67 | 14 | - | 81 |
| Gambhir basin | 27 | 49 | - | (including<br>Baretha bund) |
| Ruprail basin | 20 | 14 | - | 34 |
| Tanks in Dholapur sub-divison | - | - | 17 | 17 |
|  | 114 | 77 | 17 | 208 |

It is a problem of only 114 tanks which are directly fed as far as regulation is concerned. If regulation done timely and skilfully least harm should be expected to the irrigation structures, human life and property. Slightest carelessness on the part of regulation staff can result in wide spread damages and catastrophic conditions. The tanks situated in different basins are located in series and water flows from a tank to another. Surplus water from the 114 tanks ultimately finds a way either into Motijhil or Ajan bund. Ajan bund Motijhil have got discharging capacity of the order of 510 cumecs and 96 cumecs respectively. Extra care is to be exercised while doing regulation of these terminal tanks.

The head regulators of the canals off-taking from the rivers or Sikri diversion bund are generally kept open before the commencement of monsoons and the silt deposited on up-stream of the gates, when they are closed, should be minimum. There is a practice of making low cross bunds across Banganga river just up-stream of head regulators of Ramesh Swami Halena and Lalita Mundia canals. These cross bunds deflect the river water into the canals during initial floods and subsequently get washed away as the discharge in the rivers increases. As long as the flow in the rivers is confined within their courses, skilled regulation would yield satisfactory results. It is only during high floods, when the rivers outflank the banks, that un-controlled water finds way into the tanks. Similar phenomenon is witnessed when marginal embankments get breached. Efforts are being made to provide extra surplussing capacities in most of the tanks to minimise the possibility of breaches.

The old practice of impounding water in the tanks for the cultivation and subsequently releasing the same through sluices for inundation on the down-stream side is getting less and less popular with the passage of time. In the olden days the farmers used to raise only rabi crop. Kharif was sown in areas which were not prone to flooding. The farmer now wants to raise both rabi and kharif crops and therefore his requirement of water stored in the tanks is growing less and less. To give an example, the Chiksana bund is lying breached for many years and there has never been a demand from the cultivators to plug the breach as the farmers have dug open wells or bored tube-wells along the periphery of water-spread. These wells generate sufficient water to take care of their agriculture.

Kharif and rabi crops. When MotiJhil was filled only upto 2.13 m. (7') towards the end of July, 78 (total guage 2.74 m. (9') there was big agitation to open Girraj canal for early depletion so that kharif crops sown in the bed of the tanks may not perish. the department, as per traditional practice, opposed the suggestion of the cultivators impressing upon them that if MotiJhil is depleted many of the fields situated in the bed where kharif has not been sown will fail to grow rabi crops also. A meeting had eventually to be called on 26th July, 1973 which was attended by M.L.A.S., M.P.S., finance Minister and other prominent farmers. The consensus of the opinion was that the head of the Girraj canal may be opened and MotiJhil depleted which was done. The opinion of the farmers owning land on up-stream and down stream of Ajan bund is also not much different and they have desired on many occasions that all the sluices of this tank should be opened in the beginning of the season itself so that water is impounded in the tank or let out abruptly flooding the down-stream side. The importance of regulation of the tanks is thus mostly confined to the safety of irrigation works and not as much to provide irrigation facilities.

While doing regulation of inflows into the tanks it should be safe to store water upto 1/3 of the tank gauge by end of 31st July, 2/3 by end of August and full tank gauge upto 15th September every year. These gauges are approximate and may be adhered to rigidly. Marginal deviation can always be done as per the weather forecast in the catchment area. When heavy inflows are expected either due to heavy precipitation or overlflanking or breaches in the marginal embankments or otherwise, timely depletion of tanks will ensure their safety.

The filling of the tanks could be started from the lower most first to the upper most in the last so that if any subsequent floods come the tanks on the upstream are comparatively less than on the down-stream. In case of lean-years when the tanks remain dry say upto 31st August the first tank in the series may be filled first so that the water is utilized for inundation and filling the tanks on the down-stream side. In this case if the last tank is filled first it is probable that the tanks on the up-stream may eventually remain dry and the chances of inundation may become remote.

Some tanks namely, Sah, Dorai, Dhandore, Ataripura, Lalpur, etc., have got sufficient discharging capacity and the regulation, therefore, can be effectively done. In case of intervening tanks which have limited discharging capacity it will be advisable to allow surplussing sufficiently. It is necessary under all circumstances to engage sincere and skilled staff on all tanks during rainy season.

Thus we have seen that whenever there is any excess water in any of the three rivers it rushes towards Motijhil and Bharatpur town. Also it is observed that floods had generally come during the month of August only. To save the Bharatpur town from flood it is very eseential to keep Motijhil empty till the end of August. In that case if there are heavy floods in any of the above rivers, Motijhil will help a lot in absorbing this flood and passing it through Girraj canal and flood rain slowly in Chiksana bund and finally in the Khari river or Utangang river in U.P.

The capacity of the Motijhil is 236 m. cft or 2730 cumecs days and the capacity of Girraj canal is 600 cumecs. The flood water of these rivers reaches upto Motijhil slowly after filling all the bunds in its way. Floods of one river can easily be absorbed and passed away through Girraj canal. In case when the duration of heavy floods remains more than 2-3 days in a river or it comes simultaneously in two rivers, this system cannot absorb the flood water and danger of flooding Bharatpur town is created. To overcome such situation anti-flood drainage scheme of Bharatpur is under construction. In this scheme deepening of outer-moat and construction of a flood drain of 2000 cumecs are included.

According to shri S.C.Rajvanshi of Irrigation department, Rajasthan, it is hoped that after completion of this anti-flood drain scheme there will not be any danger to Bharatpur city from flood. But at the same time proper and timely regulation of all the river water is very essential. Only a systematic regulation of river water as discussed

above can save Bharatur and its surrounding area from floods as well as from draught. Where is necessary to keep the floods away it is very essential to provide irrigation by flooding the field timely and to utilise this unstored river water.

This flood water is a boon also for Bharatpur as it produces bumper wheat crop and silt carried by Banganga river is said to be very good manure.

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## 9

# RELIGIOUS LANDSCAPE AND OTHER LAND COMPONANTS

Previous chapters have dealt with the land in the city as used for work places, for residential sites, for commercial and industrial purposes. The total amount of land use for these purposes accounts for a very large share of the total urban area. Land used in these categories is characterized by a relatively high intensity of use. They are the uses of cultural landscape that play an important role in the lives of the people and are, therefore the uses of which we are most aware. There is, however, large amount of space of a cultural landscape that is often overlooked in the awareness of cultural landscape and its study, this is typified by a low intensity of use. Attention in this chapter is drawn mainly to religious landscape and some other land components of cultural landscape.

### Religious Landscape

Religion a set of beliefs and practices designed to allow man to achieve mental harmony with the powers of the universe, has been an essential aspect in the development of culture[1]. Religion forms an integral part of cultural landscape. It makes an imprint on the landscape as to how do the different religions create structures, cemetries, settlement patterns and place names.

The most obvious contributions to the landscape are the buildings erected to house divinities. These structures vary greattly in size, function, style of architecture and construction material. The building materials chosen for a religious structure often demonstrate the value of religion places on its visibility in the landscape.

Hinduism has produced large numbers of visually striking temples for its multiplicity of gods, but much worship is practiced in private households. Inside the walled city there is hardly any road or street, lane or bylane, where there is no temple. About 150 temples are scattered in and outside the city wall. There are only 7 large temples situated on the main roads in the central part of the city and the other small temples are situated inside the mohhallas or residential houses. It shows a great impact of Brij-bhumi (Mathura, Brindawan and Barsana) where there are number of temples in the mohhallas. The number of mosques and temples is in direct proportion to the muslim and hindu population. With regard to the spatial distribution of the temples it may be stated that they are mainly dispersal in the walled city and within the fort. The mohhllas outside the city wall, the Railway coloney have a few temples but they are conspicuously absent in the newly developed colonies. It shows that the low income group people in the Railway coloney and other mohhallas are relatively more religious minded than the high incomegroup people living in the modern residential areas. Fort is associated with old an important temples some of which are famous for their architectural style and beauty. There are 25 temples in the campus of the fort. The Hindu temples of the city are classified into the following types:

| | | |
|---|---|---|
| 1. | Direct charge | 1 temple |
| 2. | Self supported | 16 temples |
| 3. | Under Devesthan Department | 51 temples |
| 4. | Private and homely | 82 temples |

Source: Government Devesthan Department March, 1979.

The Important Temples are the following :

**Temple Herdevji :** The famous temple of Shri Herdev ji maharaj was constructed by Shri Suraj Mal in 1957. Its priest is called as Shri Herdev ji. Its diety was installed by Maharaja Randheer Singh. Its plinth was originally kept at a height of about 3 metres from the ground level and now it has submerged almost the same height under the debris which is laid after the recession of flood from time to time. This temple is located in Kherapati mohhalla toward the Anah gate. The architectural style of the temple resembles with the fort.

**Laxman Mandir :** It stands on the main road infront of the Dahi wali gali or at the core of the city. It was constructed in 1824 by Maharaja Beldev Singh. It has a fine architectural style on red sandstone.

**Ganga Mandir :** The foundation of Ganga Mandir was laid by Maharaja Balwant Sing in 1845. Every new hindu entrant in the state service contributed a month salary for the fund meant for its construction. It is also made by red sandstone with fine architectural style at a distance of 100 metres to the northeast of Laxman mandir.

**Behari Mandir :** It is very popular amongst the people of Bharatpur and situated in the campus of the fort. The other principal temples in the fort are Regunath mandir, Bagar wala hanuman, Kisori mohan ka mandir and Lala maharaj ka mandir.

**Old Laxman Mandir :** The temple is situated at the distance of 150 metres from the south-eastern corner of new Laxman mandir. It was constructed nearly in 1767 and thus 57 years older than the new one. It has poor construction but is very popular in the area.

**Sita Ram Ka Mandir :** This temple is located by the side of the old Laxman mandir near the Yatim khana. It is very popular and is also known as Meetha charnamrit. It is nearly 10 years older than the old Laxman mandir. It is running under the Devsthan department.

**Shri Salig Ramji Ka Mandir :** It is situated near new grain mandi on the station road out of the city wall. It is estimate to be about 100 years old. The temple is visited by the people mainly from Ranjeet nagar and New mandi.

Remarkable addition in religious landscape is being done by Gulab Babu a social worker and follower of Mahatma Gandhi. A small beautiful temple named 'Bakri ki latrine' is being constructed by him behind Sarafa bazar, at the cost of rupees five lakh. It would take at least five years to complete.

Thus the total land under the hindu temples is 33.6 hectares and an average one temple is visited by nearly six hundred people.

### Jain Temples

Besides these hindu temples, there are some jain temples also located at the different places inside the walled city. These temples are given below:

1. Jain mandir, Jati mohalla.
2 Nasiaji ka mandir, outer Chandpole gate.
3. Digamber Jain mandir, Baasan gate.
4. Digamber Jain mandir, Kotwali.
5. Shrimal Jain mandir, Chauburja.
6. Oswal Jain mandir, Anah gate.and
7. Shrimal Swetamber Jain mandir, Gopalgarh.

Above seven Jain temples cover an area of 2 hectares of land and each is visited by an average of 250 jains per day. Digamber jain mandir situated at Baasan gate, is the biggest one where 80 per cent jain population reside.

**Mosques**

There were 39 mosques upto August 1947. After partition when muslims migrated to Pakistan there number had fallen down under the supervision of the rehabitation department. At present only five mosques are found in the city.

| Name of the mosques | Location |
|---|---|
| 1. Jama masjid | In front of the city post office |
| 2. Masjid Shem Sher Bahadur | Near general hospital |
| 3. Masjid Idgah | Outer Kumher gate |
| 4. Masjid Machchle wala mohalla | In Machchle wala mohalla |
| 5. Masjid Gopalgarh | Gopalgarh |

The following mosques are said to have converted into temples or gurudwaras as follows:

| Name of the mosques | Converted into |
|---|---|
| 1. Masjid Dargah Lasker Alisha, Anah gate | Residential house |
| 2. Masjid Kotwali, Kotwali | Temple |
| 3. Masjid station, Station road | Temple |
| 4. Masjid Takshal, Jatwa mohalla | Temple |
| 5. Masjid Ghosiyana, Baasen gate | Temple |
| 6. Masjid Muslim Teliyana, Buddha ki hatt | Gurudwara |
| 7. Masjid Mulla Rehman Bega, Atal bund gate | Temple |

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Source: Author's Field Survey, December, 1978.

The land under the mosques is only 2 hectares. Jama masjid lies in the centre of the city and it is the focus of vitally important situal of the Muslims.

**Gurudwaras**

There are nine gurudwaras in the city which cover 2.5 hectares of land. Each one of them is visited on an average by 280 persons. The gurudwara located by the side of the Gandhi park is the main religious centre of the sikhs. It is sixty years old.

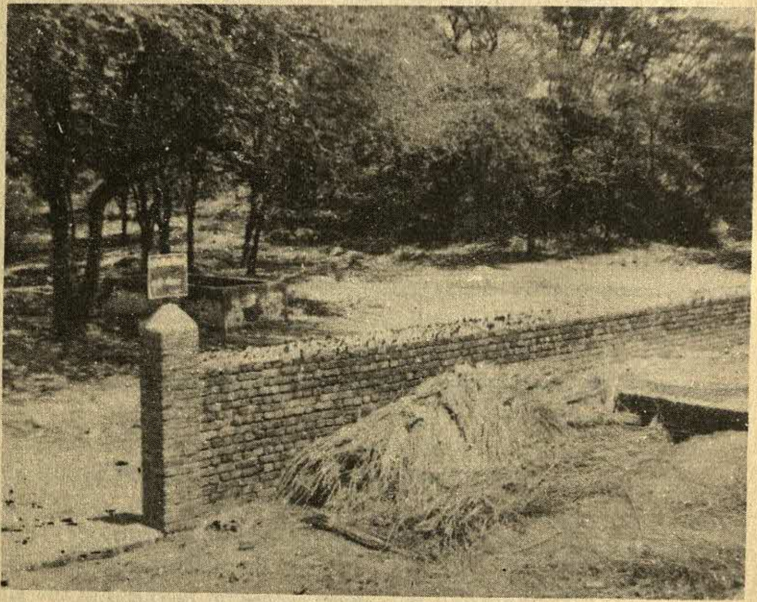
**Church**

In Bharatpur, a small church is situated in Char bagh area. It covers an area of 900 square metres of land and was constructed in 1958.

**Landscape of the Dead**

Religions differ greatly in the type of tribute they pay to their dead. This difference is expressed in the cultural landscape of an urban area. Hindus cremate their dead and therefore the cremation ground is generally a vacant land. If any thing that exists, particularly in urban areas, may be a barahdari chhatri or the stall of wood fuel.Generally there are no good roads. The area may be surrounded by a compound wall with an ordinary gate if there is any.

Since 90 per cent population of the city is of the hindus, 7 cremation grounds have been provided. They are surrounding the city on all sides outside the city wall. It may be seen that a cremation ground has been provided outside each of the principal gates so that the population residing near the gate may use the nearest one from their locality. However, they are not located exactly at the head of the gate but a little out of the way as cremation grounds are not considered as the welcome places. The cremation ground outside the Kumher gate is a little far away similarly the burial ground of the muslims is far away to the south-east facing Mathura gate. Out of the three other burial grounds of the muslims, one is inside the walled city in Machle wala mohalla and the other two outside but close to the city wall. The residents of the Machle wala mohalla are exclusively muslims and are Qusais by caste similarly the unhabitants near the other two burial grounds are also muslims. This shows the locational afinity between the community and the functional land use. Though it is an old city, even then the cremation grounds were planned far away from the habitation. This is rarely found in other cities of Rajasthan. However, the burial ground was established within the habitation and still stops then. This is why the burial ground is surrounded by residential establishments. A burial ground differs from a cremation ground in that if sets aside the land for burial purpose and erecting monuments of the deceased kin. There is only one cemetery of the christians and that too is located in Sewar village at a distance of 5 km. away to the west. The total area occupied by such a landscape of the dead comes to 15 hectares.



*8.1 Landscape of the deads inside the Goverdhan gate.*

## Landscape of Parks and Gardens

Parks and gardens are not merely the areas of recreation but they provide fresh air and congenial atmosphere for a quality of life for the urban residents. Almost one big park or garden is found in each of the capital cities of the east-while princely states. They are very important for cities which are becoming crowded with urban growth. An extensive garden is situated inside the fort. It covers an area of about 8 hectares of land. After independence a statue of pandit Nehru was installed in this beautiful and picturesque garden and since then it is named as Nehru park. However, with the growth of many offices and children's schools in the fort congestion has mounted up. So its upkeep and maintenance has deteriorated. Gandhi park is also a big park situated in front of the General post office at Pahi bagh. It covers about 68 hectares land. Recently the municipality converted the ruined Chouburja into Maharaja Suraj Mal park with an area of 250 square metres. In original plans of the new colonies they have provided sufficient land for parks and play grounds but in the absence of the growth of residential houses they are still undeveloped. There are 13 gardens in the city which cover an area of 10 hectares of land.

## Clubs

In the olden days the clubs were the places where royal famililities of the Maharajas used to spend their time in gossiping, playing cards, community prayers, dance and music, etc.

Here Bharatpur club is an important one situated near the collectorate bungalow. There some departmental clubs meant for the employees of the departments such as railway club, and officers and labourers clubs in 'Cimmco' colony.

## Libraries

There are about 14 libraries in the city. Government district library is near the mandi Atal bund and was inaugurated in 1903. It has about 35,000 books on different subjects and runs from morning to evening. It has a regular membership of 450 persons, and average number of daily visitors is 150. The business people and students come to the reading room for news papers and novels and the researchers come to consult the literature in connection with history of Bharatpur district or the city. Shri hindi sahitya samiti is also an important library located on the right of Laxam mandir. It was established in 1912. It has got about 20,000 books of hindi language and nearly 1,000 regular readers come to visit it. It gets 60 per cent aid from Rajasthan government for the development of the hindi language. Besides, there is the Maharaja Brijendra Singh library at his residence and one library in the 'Cimmco' colony. The rest of the libraries are running in the various educational institutions.

### Dharamshalas

There are 11 dharamshalas in the city. Mostly dharamshalas located at Kirnighat are Agrawal bhawan (double storied), Khandelwal Bhawan, Chimman dharamshala and Badri Saraf ki dharamshala, etc. Other five dharamshalas are located at different places viz. Parusram dharmshala on the Station road, Kamshen dharamshala near Kotwali, Agrawal dharamshala and Brahamman dharamshala near Charbagh and Jain dharamshala at Baasan gate. Bhagwati Devi dharamshala was constructed in the campus of General hospital in 1974. Parusram dharamshala on the Station road is the biggest one and has per day staying only with a capacity for more than 550 visitors. But hardly 25 persons per day is the attendance. The same position is in other dharamshalas whereas daily strength of visitors increases only at the time of marriages, examinations, Dashahara exhibition and other occasions. The land used under this function comes nearly to 25 hectares. The distribution of the dharamshalas in the city indicates that they mostly lie along the south-western side of the inner most. It is only here that the bathing ghats were constructed on the inner moat, hence the construction of the dharamshalas. None of the dharamshalas is found in the newly developing areas. It shows that there was tradition long time ago that the wealthy residents of the city used to construct such buildings for the use of general public. The money spent in this way was considered a great religious duty repayable in the next world. But in the modern times there are no Zamindars and even the Seths are under the thimble of the income tax and sales tax officers. Under such troubled circumstances nobody thinks about such religious duties. The money is rather spent on bribes and gratification these officers. Over and above that after independence such functions have become the concern of the government. The modern man would also like to go to an hotel rather than to a dharamshala. So the place of dharamshala has been taken by the hotels and lodges which have cropped in large number in outer fringe area.

### Fire Service

Fire brigade is an important aspect in case of fire. The city maintains a permanent fire brigade for the safety of public and the preservation of the public property. But in the narrow streets like Moot ki gali and Dahi wali gali near Laxman mandir where fire-brigade can not serve it is of not of much value. The brigade-van also serves the purpose of transporting water to different parts of the city where water is in acute shortage. The fire brigade station is situated in the fort campus. It is a central location for serving the entire city.

### Stadium

There is a big stadium near Military engineering service inspection bungalow out of the Kumher gate. Other play grounds are belonging to the various educational institutions as part of their respective campuses. 'Cimmco' Colony has a big play ground in front of the officers club. The other newly developing colonies also have the vast open spaces.

*8.2 The Museum building in the fort compus.*

## Landscape of Museum

The museum has also been a tradition in the capitals of Indian states due to the impact of British imperialism. Bharatpur has occupied an important place in the cultural history of Rajasthan. An idea arose in the minds of the then authorities of Bharatpur rulers in 1939 to preserve the cultural heritage of the state. The work was started with the collection of sculptures and a few other exhibits, which were on display in a room in the public library. Those were shifted to the present building of Kachheri kalan in the fort, in November 1944 under the patronage of the Maharaja Sawai Brijendra Singh who still evinces keen interest in the museum.

Within a short span of 16 years, it gradually developed into a full fledged state museum, under its first curator, Rawat Shri Chaturbhuj Das Chaturvedi. Later on the Kamra khas building was added to it, which once housed in it the armoury of the rulers, which now forms a section to the museum.

It has the collection of archaeological material from different parts of the state which made it to form the basis of state museum at Bharatpur. Even to this day, it is mostly an archaeological museum. There are five sections of the museum, 1. Archaeological—(a) Jain religion and (b) Mixed religion, 2. Armoury, 3. Arts, crafts and industry, 4. Children section and 5. Miscellaneous.

*Acrhaeological Section*: Archaeological section is the most important and is being re-organized with the financial assistance of the government of India. Wooden pedestals have been provided to the broken sculptures. Attempts have also been made to display a particular piece at its place. The marble parikar (canopy) of some jain tirthankara (79) with inscription of samvat 1679 (1622 A.D.) of the time of mughal emperor Jahangir, has also been displayed likewise. This section has some of the ancient rare and unique collections from Noh, Mallahe, Bareh, Bayana, etc. These clearly prove that the history of the region my be pushed back a few centuries before the christian era, if not even earlier. Recently a hoard of jain sculptures have been noticed at village Dahina in the bed of the river Gambhir.

*Armory section:* The rulers held their weapons in high esteem in days gone by. There are all kind of weapons used in battles of an old days. These include swords, daggers, guns, matchtocks, revolvers, lance-bow, arrow and canons, etc. All these things are of several types.

*Art Craft and Industry:* The section has been arranged as to give comparative idea of exhibits manufactured in Bharatpur region. The important articles are earthenware, pottery, glass, wood and stone. The art of weaving in stiff material like wood and ivory is a remarkable performance of the artist of Bharatpur. Fly whisks, hand fans, antimoney box, Skirt and the flower pots are the interesting articles.

*Children Section:* The section has the toys made sandal wood, ivory, paper, machies, brass stone, vegetable and fruits, besides a few specimen of zoology and collection of postage stamps. The section and with an exhibit called Gyan Chawsar which belongs to vikrama samvat 1667(1610 A.D) and depicts such an early art of embroidery in silk.

*Miscellaneous Section:* The section includes the paintings belonging to the Mugal school of the 17th century A.D., and of different school of Rajasthan. The Bharatpur paintings are of the late 18th century and depict Krishna lila scenes and some of the incarnation of Vishnu, others include paintings on Pipal leaves and the portraits of rulers.

## Landscape of Administrative Function

Some of the factors which are mainly responsible to determine the sites for administrative functions in Bharatpur city.

1. Concentration of all units close to the Royal Place for maximum co-ordination and administrative co-operation.
2. Maximum administrative units to the general public of the city.
3. Accessibility of the administrative units to a particular place.

Above mentioned factors have resulted in the concentration of all the administrative office inside the fort's campus. This is true in the case of many fort towns in Rajasthan. With changing times and administrative set-up the old monarchy has been replaced by a democratic constitution. Thus the administration became decentralized. Nearly 8 administrative offices were developed without any plan and set-up inside the fort campus and others have been located at different places in or outside the walled city. Some other offices have set-up wherever they could get cheap and good accommodations easily. Therefore, the administrative zone could not be developed properly in the city. At present the fort's campus and the collectorate area are the important centres where many offices have been located. Rest of the administrative offices are scattered in the municipal boundary.

The government is not in a position now to shift the various administrative offices to any particular place due to its poor condition. According to the functional activities, the offices can be classified as follows:

1. Central offices.
2. Semi central offices.
3. State offices. and
4. Semi state offices.

### Central Offices

There are only a few central offices in Bharatpur city, such as the railway office, post office, telegraph office, telephone office, income tax office, chief ordinance and ammunition depot. All these offices are scattered outside the city wall. Ammunition depot is 9 km far from the Goverdhan gate.

### Semi Central Offices.

There are only two semi central government offices in the city. The Zila Khadi Gramoudyog Samiti and office of the Food Corporation of India.

### State Offices

There are 47 state government offices in Bharatpur city. These have been located at different places. The number of employees is 9,100 under the state government.

### Semi State Offices

Such offices are located in different places in the city and their total number is 13. These are Rajasthan State Electricity Board, Wholesale Sahkari Upbhokta Bhandar, State Transport 'Co., Central Cooperative Bank, Land Development Bank, Urban Improvement Trust, Krishi Upaj Mandi, E.S.I. dispensaries, Social welfare Sangh, Incharge S.F.D.A., Municipal Council and Zila Parishad.

**Table 9-1**

**Government offices, 1978**

| Type of department | Total number | Total employees |
|---|---|---|
| Central offices | 5 | 1,800 |
| Semi Central offices | 2 | 0.087 |
| State office | 47 | 9,100 |
| Semi state office | 13 | 1,154 |
| | 67 | 12,141 |

Source: District Employment office Bharatpur, March, 1979.

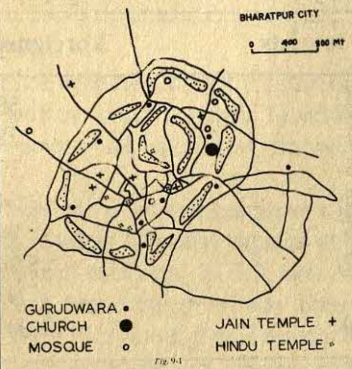


Fig. 9-1

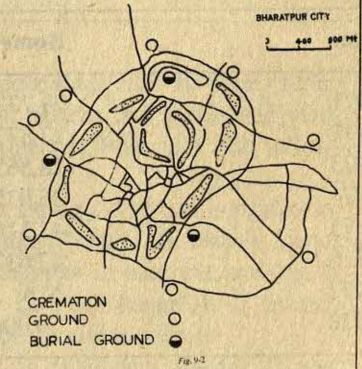
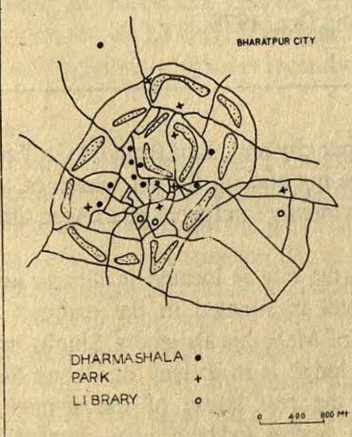


Fig. 9-2



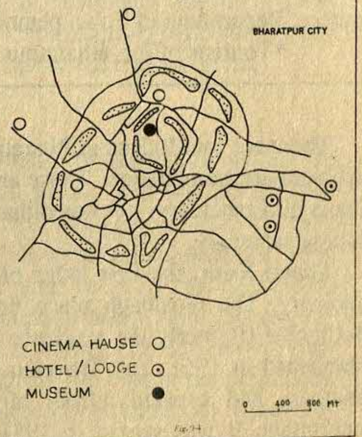


Fig. 9-4

Thus the landscape of administrative function covers different types of offices with strength of about 12,141 persons which forms 13.5 per cent of the total population of the cultural landscape. The total area of 30 hectares is used for administrative function.

**Hotels, Lodges and Dak-bungalows**

Bharatpur became a tourists centre due to the Ghana bird sanctuary and therefore, the hotels and lodges are very essential for the tourists mostly come from U.S.A., U.K., U.S.S.R., Australia and Holand. The number of foreigners and home tourists visited Bharatpur from 1971 to 1978 is as follows:

**Table - 9-2**
**Tourists in Bharatpur city (1971-1978)**

| Year | Home tourists | Foreigners |
|---|---|---|
| 1971 | 29,722 | 583 |
| 1972 | 27,877 | 285 |
| 1973 | 28,565 | 390 |
| 1974 | 36,035 | 2,645 |
| 1975 | 43,316 | 947 |
| 1976 | 47,637 | 5,745 |
| 1977 | N.A | N.A |
| 1978 | 50,000 | 12,000* |

Sources: Department of Town planning Dec. 1978
*Tourists office, Bharatpur.

There are four lodges in Bharatpur city and all of them do not have sufficient accommodation. Those are not enough for the season of the Ghana bird sanctuary. It is noted that mostly foreigners go to Agra after visiting sanctuary.

Shanti Kutir, the first lodge of the city is located in Ghana bird sanctuary. The Goalbagh place hotel is situated in the campus of Motimahal (formerly the residence of Maharaja Brijendra Singh) was established in 1951. The Travelers lodge is in th way of Ghana bird sanctuary and situated infront of the rest house of the irrigation department. It was started in 1951. Forest lodge is also situated in

Ghana bird sanctuary near Shanti Kutir was started in 1976. The details about their accommodation is given below:

**Table** 9-3

**Lodges in Bharatpur 1978**

| Name of the Lodge | Accommodation |
|---|---|
| 1. Shanti kutir | 5 Double bed rooms |
| 2. Goal bagh Palace hotel | 22. Double bedrooms |
| 3. Travelers Lodge | 6 Double bed rooms and |
| | 2. Double bed rooms (Air-Condition.) |

Source: Author's Field Survey, Dec.,1978

It has become function that the funded lords after the lapse of their privy purses converted their luxurious palaces into hotels and made them commercial enterprises. So the rulers of Bharatpur also follows suit.

There are three dak bungalows in the city. The dak bungalow of P.W.D. (Swagat Bhawan) situated in front of the U.I.T. mainly for the officers and ministers. M.E.S. dak bungalow is near the crossing of metre and broad guage railway lines. One dak bungalow is situated behind of Police line & that is mainly for the police officers.

There are three rest houses, one in 'Cimmco' for the factory employees, one at the Goverdhan gate for the military officers. The rest house of irrigation department recently converted into an office.

### Cinema

Cinema is a cheap and popular mean of recreation for all the communities. In Bharatpur city, the first picture hall was started near Barkota temple at Beenarayan gate in 1938 when the first silent picture 'Matwali Meera' was screened. Next, 'Herdayal takies started in 1940 under the tin sheds just inside the Anah gate. These two theatres closed within three or four years of their inception and a new picture hall named 'Bharatpur picture palace' was established inside the Kumher gate in 1948. It was only the picture hall till 1967 when the population was nearly 60 thousand. With a great demand of industrial labour and other people, a new preture hall 'Murli Chitrlok' started near railway station in 1968. 'Neel Kamal' was established near Gopalgarh gate inside the fort's campus in 1972. 'Bhagwan picture palace' just started outside the Kumher gate in October, 1978. All these halls can accommodate nearly 3,000 persons and therefore, there is much scope for the development of cinema houses. The 'Neel Kamal' is not running properly due to the unsuitable location which is an important factor for such industry. Now, the next picture hall should be established outside the Mathura gate where the three new colonies are developing.

**Ghana Keoladeo**

In Bharatpur there is a lake called Ghana where birds from as far as Siberia, Finland, etc., visit during the winters. Thus is has grown into a famous winter resort of wild fowls and many other types of birds, as well as a natural laboratory attracting many tourists for recreation and ornithologists for scientific investigations on biological aspects of the water birds.

It is an extensive area of about 2,832 hectares submerged under water and developed into a famous water bird sanctuary, situated at a distance of about five kilometres south west of Bharatpur city. It has acquired the name of Ghana Keoladeo because of the existence of a temple of Keoladeo or Lord Shiva within a dense forest. Ghana is synonym for dense forest.

The Ghana bird sanctuary was developed by the efforts of Maharaja Kishan Singh during his reign from 1895-1929. He was impressed by the exquisite beauty of duck shooting spot in England and so thought of developing a similar beautiful spot in Bharatpur. The lake was completed by the end of 19th century and after two years the sanctuary was ready for duck shooting. The dense forest was flooded with the waters of the Gambhir river during the rainy season and then drained out in such a way that the water filled the lowlands on either side of the road. Muddy butts were built with shady trees in the shallow waters for the hunters for duck shooting. Here a variety of birds are attracted as soon as the monson sets in. Besides, there are many Siberian birds which abound here. These are Ardeola grayit, Nycticorax mycticorax, Ardea cincrea, Ardea purpurea setting in the tree tops. After December when biting cold sets in ducks fly from the frozen Siberian plateau and drop in at the Dal lake and the Wular lake of Kasmir and further drop in Ghana sanctuary. They stay here for about two months in winters.

**Fatehpur Sikri**

Twenty two kilometres south-west of Bharatpur by road or rail lies an imperial capital, Fatehpur Sikri, deep-frozen in time. When Elizabethan English men came to Fatehpur Sikri in 1583 to meet the great emperor Akbar, they were highly amazed to see the splendid buildings.

Fatehpur Sikri is now deserted and left in solitude to reminisce over its past glory. It is a sleeping beauty of a city and, to tell the truth, its entire history sands like a fairy tale. The tale began when Akbar, desperate because he had no heir, decided to visit a Moslem holy man, Shaikh Salim Chisti, who lived in a small village. The Shaikh blessed Akbar and, in turn, the emperor was blessed with a son, whom he named Salim in honour of the holy man and who later took the throne at Jahangir. The grateful Akbar decided to move his capital to the village. In 1569, he died.

Fatehpur Sikri lies on a rocky ridge over three kilometres long and 1.5 kilometres wide. At the foot of the ridge, he created an artificial lake measuring 32 km around. The lake formed one side of the city; the three others were protected by awesome walls with nine gates. In all, the circumference of the capital was over 112 km. Here, as at the Agra fort, there is the same specialization of buildings with impressive public halls and delightful private residences under separate roofs. But there is more unity in the architecture of Fetepur Sikri.

Probably the greatest structure in the city in the Jama masjid, the imperial mosque built around 1575. For miles around, its victory gateway, Buland darwaza, can be seen looming over the capital. This triumphant portal sums up Mughal power and it was built by Akbar after he conquered Gujrat.

The other main public building of Fatehpur Sikri lies just inside the gates of the capital. This is the Diwan-i-Am, the hall of public Audience, more than 350 feet long. Other vantage points at Fatehpur Sikri are Panch mahal, Jodha Bai's palace, Birbal's Palace, Turkish Sultana's house, etc.

**Idle Cultural Land**

Vacant land is a type of open space that is not devoted to any functional use and possibly never did, and in this sense it is an idle cultural land. The area surrounding the mud-wall to the circular road (outer moat of the city) and the vacant lands around the cremation ground and exhibition ground near M.E.S. bungalow out of the Kumher gate falls under this head. It covers nearly 37.5 per cent of the total area of the cultural landscape.

This chapter has delt with the religious landscape and the ways in which large amount of cultural landscape is utilized in a less intensive manner. The cultural landscape abounds with expressions of religious beliefs, places of worship-temple, mosques and churches which differ in appearence, distinctivess and prominence. These religious buildings show a visual legend to the various faiths. Cemeteries and religious place names also add a special effect to the landscape that tells us about the religious place names also add a special effect to the landscape that tells us about the religious character of the population. Large number of temples and place names after them pervade throughout the city. They give an expression of extensive hinduism. It may be due to the closeness of Mathura (Brij Bhumi) and the former hindu rulers.

Land types include some cases, of dynamic nature because their present role may change with passage of time, such as vacant cultural land. The other types discussed are of a more static nature and would not likely to change their functions in the near future, such as land used for cemeteries and land devoted to open spaces. In this regard the land types are somewhat different from those discussed in the previous chapters.

## REFERENCES

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# 10

# CONCLUSION—PROBLEMS AND PLANNING

The landscape study of Bharatpur city with relation to the environs as given in the foregoing chapters indicate that the city is developing with many problems. The city is nearly 240 years old but looks much older because of its old settlement pattern, poor maintenance and ruined house structure within the walled city. There is huge congestion mainly towards the core or central business district due to very high density of population. The high growth of population is creating many human problems of housing and employment. There is an acute shortage of the residential houses the condition of which is very poor. Most of them are without lavatories and with dirty lanes and alleys. The whole city suffers from jpoor drainage, lack of sewage systems and also from the unhealthy environment of slums.

Due to multi-ownership, shops are falling or decomposing. Contrarily, rising demand and non-availability of shops in the market centres is becoming a serious problem of the day.

Industrial landscape has been neglected due to lack of (a) government support, (b) proper guidance and (c) financial support for small scale industries. The industrial labour has not been provided with residential facilities. They, therefore, live in pitiable conditions.

Unsatisfactory health and medical services, shortage of educational institutions and other essential amenities are some of the deficiencies of the city.

Most of the schools are located in the walled city in highly noise polluted areas without any play grounds and sufficient space. The walled city is lacking in recreational facilities, parks, lawns and postal and telegraphic services. The city has only four overhead water tanks which are not sufficient for adequate water supply throughout the cultural landscape. The supply of water is not in accordance with the distribution of population and their economic activities in different parts of the city. Streetlights are not rendering proper service in peripheral mohalls of walled city and in slums.

The stagnant water in the moat has become the nursery of mosquitoes and various germs. The same water is drawn through the wells dug into the moat and used for drinking purposes. This is hazardous for health of the people in the surrounding areas.

Most of the government offices are located in the old buildings of the walled city and suffer from scarcity of space. They have no space for car and cycle parking. In the rainy season, floods which are an annual feature, create very serious problems not only for Bharatpur city but also its environs, badly affecting the different aspects of the economy, thus restraining the development cultural landscape.

It is assumed that the city will continue to be a major administrative centre and retains its status as the main centre of industrial and commercial activities. On account of fertile soil and growing irrigation by surface and underground water resources in the environs, the city will develop its trade in agricultural produce and introduce several agro based industries.

The future population projections of Bharatpur, as discussed in the second chapter, indicate that there will not be any abnormal growth during the next twenty years, and most of the variables which have been affected in the past will continue to operate in the same way in the future also. While applying various statistical techniques for projecting the future population of Bharatpur, it is estimated that by the year 2001 the population will attain a figure of about 1.75 lakh at the growth rate of about 5% per year. The estimates of the prospective composition of the working force are generally based on the past trends and future potentialities of the various sectors of economy. By the end of 19th Century, the working force shall constitute 43,400 persons and will form 24.8 per cent of the total population.

Certain occupations are likely to increase while others will decrease during the next two decades, as detailed in the second chapter. It is suggested that some highly developed industrial estates should be brought into existence in suitable areas (outside walled city), taking into account all the factors of location and planning. Consequential increase in trade and commerce will also follow. Thus, both industrial and commercial landscape would be in a position to accommodate the future working population.

Residential landscape of the city occupies an area of 540 hectares of the total land (1975). It will increase to about 1050 hectares by the end of 2001 A.D. The number of residential houses would also be doubled. The area of the walled city is rather congested and now there is no possibility of expansion of residential land. However, a trend towards vertical expansion is inevitable by the construction of multistoried houses by the well-to-do community in the walled city.

The existing residential colonies are also expanding. But the flood water which flows from north-west to south-east affects Ranjeet nagar, Railway colony and Cimmco colony. The only sector of Ranjeet nagar Colony which is fully developed, is situated in a depression and there is no exit for water when the area is inundated by breaches in the Motijhil. The residential development of the remaining three sectors of Ranjeetnagar is possible only when the problem of flood water is solved. It is suggested that the capacity of Motijhil and Ranjeet nagar drain be enhanced. The other three colonies situated to the east out of the Mathura Gate are affected by local rains as there is no proper drainage system. Here the drains should be constructed in such a way that the water of local rainfall is drained out into the Girraj canal.

In addition to the houses built under the Housing board scheme, the government should provide houses to all the government and semi-government employees and the private organisations should also be legally obliged to do so for their own employees in a planned way. This would go a long way in reducing the difficulties of the employees on transfer to this city.

The slums which are developing near the mud wall do not have proper sewage system. Therefore, the municipality should provide public lavatories for them and these should be properly maintained.

It is suggested that two other new colonies may be developed, one outside the Neemda Gate and the other outside the Anha Gate. The number of plots should also be increased in the Housing board colony. Labour colonies should also be constructed near the industrial areas.

Sewage disposal clearly shows a relationship between drainage system and residential areas. In the absence of proper drainage system almost all the drainages are generally blocked, silted and full of exeretions and other foul matters.

## Plan For Drainage and Sewage Disposal :

For the proper planning of drains and sewage disposal, the folowing steps may be taken:

(1) The damaged wall of fort moat should be repaired so that sewage of surrounding mohalls should not be disposed off into the moat.

(2) The mud wall of outer moat should be improved and retained as a historical monument. But a drain may be constructed parallel to the circular road, while the small drains of the walled city be connected to the circular drain and further this circular drain should be connected to C.F.C.D. The sewage disposal of Ranjeetnagar, Railway Colony and Industrial Area be carried to the Girraj Canal.

(3) The foul matter of General Hospital should also not be disposed off in the moat. For this, a drain may be constructed around the fort-moat.

For various historical, traditional, economic and other unavoidable reasons the existing central business district (C.B.D.) is to continue to remain as the most important centre of commercial landscape. As there is no place for its expansion it may sprawl into the lanes and by-lanes. An extension of this central business area can be made on the Arya samaj road, Mandi atal bund and Dahiwali gali. The wholesale vegetable market located behind the Jama Masjid may be shifted to Goal bagh road out of the Mathura gate. To decentralise the commercial activities it is proposed to make the specialised market centres.

**Table—10-1**

**Proposed plan for commercial structure***

| Name of the articles | Number of shops in 1978 | Number of shops for 2000 A.D. |
|---|---|---|
| Grocer | 770 | 1497 |
| Household | 151 | 293 |
| Service | 564 | 1097 |
| Fancy | 395 | 768 |
| Miscellaneous | 142 | 276 |
| Total : | 2022 | 3931 |

* Source: Personal survay, 1978 and proposed shops on the basis of one shop per 43 persons as a standard.

The detailed survey and analysis of the commercial zone and shopping structure of Bharatpur given in Chapter IV indicates the basis for future development of this tertiary activity. The result of the above analysis has shown that a shop is needed per 43 persons of the population (p 130). Accordingly it is assumed that a total number of nearly 4,000 shops will be needed by the year 2000 A.D. when the population of the cultural landscape will attain a figure of 1.75 lakh. The analysis has also brought forth the ratios of shops of different articles. On the basis of the same, it has been possible to denote the number of shops under each head:

The circular road which is being used for heavy traffic should also be changed. After constructing the circular market the heavy traffic should pass from Kumher gate to M.E.S. Dak bungalow and then to the New mandi. A piece of metalled road from the end of the Mal godown road should be built to the college via behind the Krishna colony.

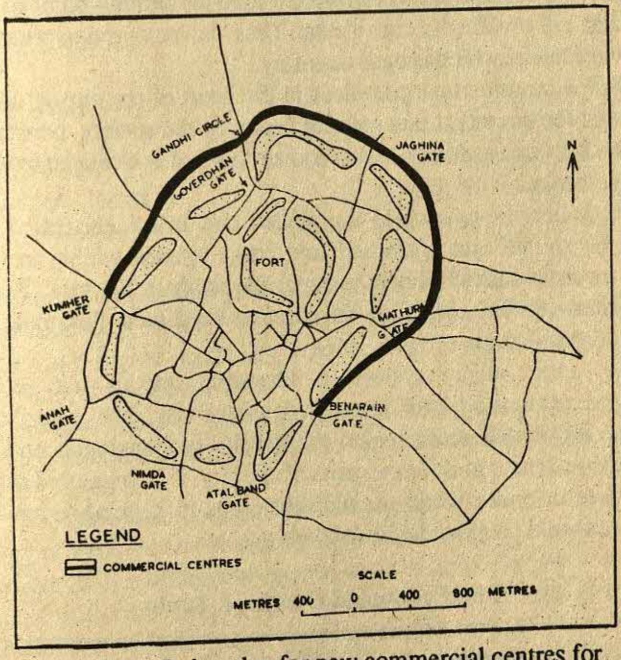

*Fig.* 10-1 Index plan for new commercial centres for Bharatpur city

There is an urgent need to find out the location for the new establishments. The author proposes some important places for commercial centres. One shopping centre may be developed on either side of the circular road from Kumher gate to Gandhi circle, second commercial centre may be developed on either side of the circular road from Gandhi circle to old power house, and the third marketing centre may be developed from roadways bus stand to Beenarayan Gate. The Bus Stand should be shifted near the Beenarayan Gate. All the three marketing centres would accommodate nearly 2000 shops. (Fig. 10-1). These marketing centres can serve both walled and extra walled city. Small neighbourhoods should also be formed in the new developing colonies. The dust-bins should be kept in the different places of the marketing centres. The particular places should be allotted for the padlers as their mobility in the narrow marketing centres creates traffic congestion. The prostitution is running in the main market centre near Ganga mandir and therefore the people while running on the road on cycle or motor-cycle look towards them upto the turning point of Loha bazar and get involved in accidents. Thus the prostitution should be shifted to Malahe which is their mainstay.

This prostitution spot prevelent in the heart of the city is, in fact, hazardous for the moral and cultural health of the society, particularly children. Hence it is desirable that sooner this evil is removed from this place the better.

The industries running in the walled city in the congested areas should be shifted and converted into many shades which are lying vacant in the industrial sectors towards the north of the city. There is urgent need of a link road from the Circular Road (near Surajpole gate) to the industrial estate.

The water supply system in Bharatpur city is not properly developed and not uniform in all parts of the city. The water supply must be distributed according to the density of population and their economic activities in different parts of the city. It is suggested that the department of water works should take steps to develop some other overhead thanks as given in the following table :

**Other proposed Overhead Tanks**

| Sr. No. | Area of the tank | Height | Water capacity |
|---|---|---|---|
| 1 | Near Chouburaja | 20 metres | 2 lakh gallons |
| 2 | Outer Kumher Gate | 20 metres | 2 lakh gallons |
| 3 | In Krishna Colony | 20 metres | 2 lakh gallons |

These seven overhead tanks would better serve the walled and extra walled city and also the industrial area. The number of public taps should be increased in the mohallas.

The average number of students is very high in all the different educational institutions and, therefore the number of educational institutions should be increased according to the demand of student population. The table given below shows the proposed number of educational institutes for the next 20 years :

**Proposed number of educational institutes for the plan period (upto 2000 AD)**

| | | |
|---|---|---|
| Primary Schools | 120 | 400 student in each |
| Middle Schools | 60 | 35 for boys and 25 for girls with 500 studentsin each. |
| Higher Secondary | 24 | 15 for boys and 9 for girls with 750 students in each. |
| Colleges with post graduation classes | 5 | 3 for boys and 2 for girls with 3000 students in each. |

The primary education centres should have to be located outside the walled city mainly in the new developing colonies. However, college and higher secondary schools may be established out of the Anah Gate and Mathura Gate.

Sanatam Dharam Higher Secondary School running near Laxman mandir (the heart of C.B.D.) should immediately be shifted out of the walled city.

The number of hospitals and dispensaries is insufficient and the quality of their service is also far from satisfactory. It is suggested that a number of dispensaries be opened in the walled city and a hospital at least of 150 beds be provided outside the Govardhan gate for the industrial area, Ranjeet nagar and north-western part of the walled city. Generally the standard for hospitals is calculated at the rate of 3 to 4 beds for every thousand population. Accordingly Bharatpur shall need about 700 beds for 1.75 lakh population by the end of 2000 AD. It is advisable to have one health centre with 10 beds in every new colony.

The number of doctors and other medical staff should be increased in the hospitals. The residential plots for doctors should also be provided in the campus of hospitals. The number of dispensaries and family planning centres should also be increased in environs of Bharatpur city.

The post offices in the walled city have great pressure on counters. According to the rules the city should have at least 40 post offices at present and 75 by the end of 2000 AD. On an average one telegraph office is serving approximately 5 sq km area or 12 thousand population of the city which is highly inadequate. A telegraph office is needed each at Kumher gate, Kotwali and Mandi atal band. Besides, a number of public telephone booths are needed at several public places. Such other community facilities like police stations and clubs may also be provided in each of the newly developed colonies. If any Cinema house is given licence, it should be allowed out of Anah gate.

In Machhliwala mohalla, as the population has increased to great extent, it is not proper to use the burial ground. Hence a new ground should be provided for this purpose outside the Chandpole Gate.

Inside and around Bharatpur there are quite a few picnic spots, historical monuments and buildings of architectural interest. Such mnuments and buildings are to be protected and should get appropriate environs through landscaping for the tourists. In fact, many of the valuable articles and important items of historical significance were stolen away by the local employees of the museum during the times of Maharaja Brijendra Singh. This practice should be checked by the concerned authorities in the national interests. The zoological and coins department which is closed, should also be reopened to attract tourists and researchers.

The moats around the fort and the city should be converted into beautiful waterscapes for the attraction of the tourists. It should be made beautiful by posting floodlights focusing at fountains which may be installed. Yachting may be developed on beautifully carved out boats by oarsmen, who may systematically sing local folk songs for the amusement of the visitors at night.

The city bus services can be started here in the extra walled city mainly from the station to the college, the Ghana sanctuary, the industrial area, the amunition depot, Sewar and on the Circular road. The autorikshaws may be permitted only for the extra walled city. This would go a long way to solve the transportation problem and to boost the urban activities.

**Table—10-2**

**Spatial Pattern of Land use in 1978 and proposed for 2000 AD**

| Sr. No. | Landscape use | 1978 Area in hectares | 1978 Perscentage to total area | 2000 AD Area in hectares | 2000 AD Percentage to total area |
|---|---|---|---|---|---|
| 1 | Residential | 540 | 15.88 | 1230 | 24.10 |
| 2 | Industrial | 654 | 19.23 | 1330 | 26.07 |
| 3 | Commercial | 80 | 2.30 | 155 | 3.03 |
| 4 | Religious | 100 | 2.90 | 155 | 3.02 |
| 5 | Recreational | 20 | 0.60 | 36 | 0.70 |
| 6 | Waterscapes | 80 | 2.30 | 155 | 3.05 |
| 7 | Transportation | 200 | 5.80 | 350 | 6.88 |
| 8 | Educational | 90 | 2.60 | 175 | 3.80 |
| 9 | Administrative | 35 | 0.88 | 65 | 1.20 |
| 10 | Historical Buildings | 46 | 1.20 | 46 | 0.90 |
| 11 | Others | 300 | 8.8 | 582 | 11.46 |
| 12 | Open Space | 1275 | 37.51 | 900 | 16.14 |
|  |  | 3420 | 100% | 5175 | 100% |

Note : The area for 2000 AD has been proposed according to the population growth and their requirements.

In order to plan the Bharatpur City for the envisaged population of 1.75 lakh in 2000 AD the allocation of land for different landscapes has been made as given in the above given table.

The present area of 34.20 sq km should be gradually increased to nearly 51.75 sq km by the end of 2000 AD to accommodate the different landscapes. The Table 10-1 compares the present land use with the land use to be developed according to the author by the year 2000 AD. The residential area in the proposed land use in raised to 24 per cent which is a little less than the generally agreed upon for American cities. An addition of 690 hectares of land will not reduce the congestion mainly in the walled city. For this is may be suggested that the municipality should encourage multi-storied houses, maintain roads properly and stop all encroachments. All the public offices should be shifted from the walled city to a newly built administrative zone where new buildings should be constructed in the Bharatpur architectural design.

The commercial landscape of the city will have 3.03 per cent of the total area by the end of 2000 AD. This is in accordance with Murphy who proposes less than 5 per cent of the total area for the commercial landscape. An addition of 75 hectares is adequate for bringing about a few market centres and neighbourhoods and to accommodate the total number of 3931 shops as computed in Table 9-1. Industrial landscape will rise by 8 per cent for the development of agro-based industries like oil mills, dal mills, cotton textiles, etc.

The increase in the transportation is also anticipated compatible with the growing needs of rising population, expansion in tourism and industrial landscape. Therefore, 6.88 per cent of the land use has been earmarked under this head. Similarly, 68 per cent increase in the educational land use has been proposed to cater the demand of primary, secondary, higher secondary schools and colleges. The open land will automatically be reduced to meet the demands of different land uses. The religious landscape, waterscape and the land use under historical buildings would be affected a little.

It is a comprehensive programme of cultural development, considering both the immediate needs and those of the foreseable future. It is basically concerned with the location, intensity and amount of land development required for the varied functions of the cultural landscape.

The settlement pattern, demographic aspects, rural economy and social amenities of the city environs clearly reveal that the area is socially, economically and culturally linked to its central city. The impact of cultural landscape of Bharatpur city on its environs is apparent. But flood is the major problem of the region for which steps should be taken as suggested in the relevant chapter 8 . Otherwise the development of the city and its environs would continue to stagnate.

# APPENDIX O-A

## Names of the settlements with Code Nos.

*DEEG TEHSIL :*

(109) Mathera, (110) Madhuwana, (111) Rundh Gharwari, (113) Chak Gharwari, (116) Jatoli Kadeem, (117) Korer, (118) Kasot.

*NADBAI TEHSIL :*

(54) Kawai, (55) Hasanpur, (56) Karhi, (57) Binua, (58) Sewla, (59) Gadhouli, (60) Paharsar, (61) Rena, (62) Khatoti, (87) Dahra, (89) Sahpur, (90) Lulhara, (91) Nagla Bahua, (92) Bajhera, (93) Basia Kalan, (94) Kothan Kalan, (95) Kothan Khurd, (96) Gagwana, (97) Chainpura, (98) Bachanadi, (99) Chak Bhikki, (100) Pingora, (101) Chak Nihal, (102) Chak Chhatar, (103) Atari, (104) Alipur, (105) Tohila, (106) Lakhanpur, (107) Basia Abahi, (108) Dayawali, (112) Jahangirpur.

*BHARATPUR TEHSIL :*

(6) Jaya, (7) Jahangirpur, (8) Dhansoti, (9) Reethoti, (10) Pala, (11) Mukandpura, (12) Saheti, (13) Sitara, (14) Set, (15) Rundhirpura, (16) Gagarsoli, (17) Tamrer, (18) Karada, (19) Didwari, (20) Nangla Bagga, (21) Talpura, (22) Gunsara, (23) Takhat, (24) Ajan, (25) Abhori, (26) Sajola, (27) Saman, (28) Khan, (29) Dandoo, (30) Indoo, (31) Koomha, (32) Santhri, (33) Maharath, (34) Gadhera, (35) Dhokas, (36) Supavas, (37) Bilamti, (38) Sikrori, (39) Ramnagar, (40) Pichumar, (41) Mahrawar, (48) Hingoli, (49) Jodhela, (50) Astayan Kadeem, (51) Astayan Jadeed, (52) Nagla Garoli, (53) Peedhi, (54) Sikrora, (55) Dhanwara, (56) Indrapura, (57) Sarsai, (58) Kumher, (59) Lakhan, (60) Surota, (61) Sunari, (62) Awar, (63) Mahganwara, (64) Maroli Khurd, (65) Maroli Kalan, (66) Rundh Rarah, (67) Rarah, (68) Satrook, (69) Adhera, (70) Bilothi, (71) Burawai, (72) Sahnawli, (73) Dhorumui, (74) Senthra, (75) Nangla Hathani, (76) Jatoli Rathman, (77) Korath, (78) Baghai, (79) Kolipur, (80) Pipla, (81) Chak Peepla, (82) Noganwa, (83) Hatheni, (84) Jagheena, (85) Abar, (86) Sogar, (87) Nagla

Harchand, (88) Nagla Budhsing, (89) Nagla Malloo, (90) Dahra, (91) Chakuluchupri, (92) Balara Khurd,(93) Adhiya Kalan, (94) Adiha Khurd, (95) Belara Kalan (96) Nagla Mainthana, (97) Kawadia, (98) Sakeetra, (99) Jarhara, (100) Rundh Helak, (101) Nagla Ajau, (102) Ajau, (103) Pahuva, (104) Nagla Maina, (105) Usrara, (106) Khera Karoli, (107) Gohawali, (108) Godhavali, (109) Bansroli, (110) Padola, (111) Pooth, (112) Chimni, (113) Chak Bani, (114) Bani, (115) Roondh Bhatawli (116) Bhatawli, (117) Chak Paprera, (118) Seehi, (119) Paprera, (120) Moroda, (121) Khanswara, (122) Sunera, (123) Chak Bishda, (124) Bishda, (125) Nagla Bhat, (126) Chitokari, (127) Dhanota, (128) Bansi Khurd, (129) Raghwasi Khurd, (130) Jharouli, (131) Nagla Dharmsingh, (132) Chak Hindola-I, (133) Chak Hindola II, (134) Hindola, (135) Nagla Hargovind, (136) Dhari Jalimsingh, (137) Nagla Raoji, (138) Helak, (139) Baban, (140) Pichgai, (141) Rundh Sakeetra, (142) Seh, (143) Chak Seh, (144) Nagla Manjhi, (145) Nagla Bagheri, (146) Nagla Ganga, (147) Nagla Sawai Ram, (148) Nagla Jodhsingh, (149) Ghana Bhandor, (150) Chak Ghana Bhandor, (151) Nagla Tuheeram, (152) Nagla Jeewana, (153) Nagla Karansingh, (154) Chak Nagla Karansingh, (155) Borai, (156) Chak Borai, (157) Rundh Seh, (158) Rundh Kasoda, (159) Kasoda, (160) Anipur, (161) Chak Sandroli, (162) Sendroli, (163) Sadhpur, (164) Nagla Khuntela, (165) Adda, (166) Sewar Kalan, (167) Sewar Khurd, (168) Madhoni, (169) Pilua, (170) Tatamar, (171) Munrotha, (172) Kakalpura, (173) Taharki, (174) Basuva, (175) Bansi Kalan, (176) Tada (177) Dhor, (178) Dhandholi, (179) Habibpur, (180) Par, (181) Bagdhari, (182) Mahuwa, (183) Sinpini, (184) Ludhabai, (185) Bhawanpur, (186) Sukhawli, (187) Syrona, (188) Manroli, (189) Jheelra, (190) Anah, (191) Golpura, (192) Achalpura, (193) Murwara, (194) Chak Murwara, (195) Adi, (196) Khanjoli, (197) Girdharpura, (198) Chak Bhandor, (199) Bhandor, (200) Gundwa, (201) Tuhiya, (202) Tontpur, (203) Tyonga, (204) Madarpur, (205) Barakpur, (206) Noh, (207) Jhiroli, (208) Parinagar, (209) Gaonri, (210) Nagla Gulabi, (211) Nagla Hathipura, (212) Nagla Parasram, (213) Phulwara, (214) Machhauli, (215) Suti, (216) Nurpur, (217) Ghusiari, (218) Bharanagarpur, (219) Chak Daulatpur, (220) Chak Balteekri, (221) Chiksana, (222) Chak Hathkauli, (223) Thei, (224) Chak Undra, (225) Undra, (226) Charliganj (227) Ikran, (228) Rundh Ikran, (229) Bhajera, (230) Nagla Kesariya, (231) Bachamdi, (232) Nagla Gopal, (233) Jatoli Ghana, (234) Barso, (235) Araji Salga, (236) Ghasaula, (237) Sunari, (238) Maloni, (239) Samaspur Khurd, (240) Piriani, (241) Khemra, (242) Bansi Baraina, (243) Birawai, (244) Nagla Peema, (245) Chak Mahroli Mafi, (246) Nagla Taroda, (247) Mehtoli, (248) Tehra Lodha, (249) Nagla Duleram, (250) Nagla Seekham, (251) Chak Bahnera, (252) Bhanera, (253) Srinagar, (254) Malah, (255) Kumaha, (256) Khadera, (257) Ramnagar, (258) Chak Ramnagar, (259) Khokhar, (260) Dhyopura, (261) Banji, (262) Chak Ekta, (263) Ekta, (264) Kharera, (265) Ajan, (266) Chak Ajan, (267) Chak Kaprola, (268) Kaprola, (269) Uncha Gaon, (270) Chak Unchagaon, (271) Aghapur, (272) Kaproli (273) Chak Kurka, (274) Nagla Kalyanpur, (275) Kalyanpur, (276) Tehra Ghori Banjara, (277) Ghari, (278) Chaukipura, (279) Chak Choba, (280) Chak Shyosingh, (281) Chak Dhobi, (282) Chak Shyorawali, (283) Chak Kaji, (284) Chak Nashwariya, (285) Chak Nagla Teekata, (286) Nagla Teekata, (287) Nagla Phatiyar, (288) Chak Nagla Phatiyar, (289) Darapur, (290) Chak Darapur, (291) Chak Darapur No. 2, (292) Nagla Abheram, (293) Mai Gujar, (294) Chichana, (295) Dhanaghar, (296) Sanholi.

*RUPBAS TEHSIL :*

(1) Mamtoli, (2) Shahna, (3) Chak Shahna, (4) Tahra Brahman, (5) Jaicholi, (6) Kharera, (7) Fatehpur, (8) Bhot, (9) Chak Kharka, (10) Kharka, (11) Barkoli, (12) Barapatti, (13) Jagalpatti, (14) Uchain, (15) Thiyapatti, (16) Andhiyari, (19) Baseri, (18) Bahra Rekhpura, (19) Kamasi, (20) Mudhera, (21) Nagla Tiketa, (22) Gilgiliyapatti, (23) Churari Goojar, (24) Gahlau, (25) Rundh Kharka, (26) Barhamafi, (27) Daulatgarh, (28) Sikroda, (29) Bansi Bagri, (30) Madariyapura, (31) Bahrawali, (32) Bilan Chatpura, (33) Pichoona, (34) Chakl Pichoona, (35) Haroli, (36) Nekpur, (37) Rahimpur, (38) Sari Kalam, (39) Sari Khurd, (40) Nagla Beeja, (41) Nagla Terhiya Mafi, (42) Nagla Tehriya Khalsa, (43) Pana, (44) Nagla Kalyan, (45) Kunder, (46) Kurka, (47) Sonothi, (48) Nagla Bhagwat, (49) Bhaisa, (50) Nagla Radhey, (51) Khudasa, (52) Bargha, (53) Mahal, (54) Sedpura, (55) Jindpura, (56) Gahnoli, (57) Khijuri, (58) Burana, (59) Garhi, (60) Pansoda, (61) Khanwa, (62) Odelgaddi, (64) Ghata, (65) Chandanpura, (66) Chandoli, (67) Khandoli, (68) Mahalpur Kachi, (69) Murika, (73) Chak Khundasa, (74) Ratuva, (76) Madoli, (77) Supra, (107) Barwar.

*MATHURA TEHSIL :*

(26) Kothera, (27) Buchgaon, (28) Shok TA, (29) Shok Dehat, (30) Nanu Patti, (31) Ahmal, (33) Nagal Chinga, (34) Mallu, (35) Shinga, (36) Loriya Patti, (37) Dhakpura, (38) Magorra, (39) Rasoolpur, (40) Chapra, (41) Gopalpur, (42) Pura, (43) Sonoth Jhanabi, (44) Sanoth Shubhali, (45) Kosi Khurd, (46) Seha, (47) Son, (48) Pali Dungra, (49) Phidera, (50) Bhadar, (51) Bagla Samant, (52) Chak Samant, (53) Lalpur, (54) Uchagaon, (57) Shahpur, (166) Mudesi, (167) Rampur, (168) Nagari, (169) Amari, (170) Samaspur, (180) Bhahai, (182) Ghana Samsabad, (184) Bhadrasa, (185) Chadgaon, (186) Khedia, (187) Beri, (188) Moti, (189) Pilapur, (190) Shersa, (191) Ghana Lalchand, (192) Ghana Beran, (193) Mal, (194) Nagla Abun, (195) Mui Uddinpur, (196) Om, (197) Chokipur, (198) Luhara, (199) Bhaderwa, (200) Kirarai, (201) Shahjadpura, (202) Ghana Jivan, (203) Sarupur, (204) Gadi Rambal, (205) Hasanpur, (206) Idanta, (207) Dharampur, (208) Jiroli, (209) Mirjapur, (210) Ganjoli, (211) Jhafarnagar, (212) Birona, (213) Jhudabai, (214) Malikpur, (215) Kawayala, (217) Baronda, (222) Parkham, (224) Jamalpur, (225) Mustfabad, (226) Thirawali, (227) Sanora.

*KIRAULI TEHSIL :*

(1) Mahadeo, (2) Dadwakara, (3) Churyari, (4) Nazirpura, (5) Bhanpur (6) Sikri Hissa II, (7) Rasalpur, (8) Karahi, (9) Chewmashalpur, (10) Ghiloi, (11) Patsal, (12) Pal Kiraoli, (13) Sanawthi, (14) Muhammadpur, (15) Sahanpur, (16) Samra, (17) Uttu, (18) Gharauli, (19) Daudpur, (20) Jajauli, (21) Bandrauli, (22) Nagla Banjaran, (23) Sirauli, (24) Dabar, (25) Bhopur, (26) Kherapat, (27) Jautana, (28) Sikri Hirsa I, (29) Jahanpur, (30) Tehra Rawat, (31) Mandi Mirjakhan, (32) Aulenda, (38) Gujarpura, (40) Narsipura, (41) Ghasipura, (42) Gurki Mandi, (67) Bharkol, (68) Tajpur, (69) Dautabad, (70) Supaira, (71) Bisairi, (72) Panchakki, (73) Gauthra, (74) Bisairi Qazi, (75) Imlaoda, (76) Khanpur, (77) Mandauli, (78) Surathi, (79) Nayabas, (80) Jharauthi, (81) Biyasa, (82) Garhi Chandraman, (84) Nagla Arua, (85) Turkia, (86) Mangrol Jat, (87) Arua Khas, (88) Chhapokhar, (89) Fatehpur, (90) Gobra, (91) Turpuri, (92) Hansela, (93) Ghariman, (94) Bhandiri, (95) Sandhan, (96) Khera Sandhan, (97) Basaiya.

# APPENDIX O-B

## Temperature Variations

| Month | Maximum Temperature | Minimum Temperature | Mean Temperature | Highest maximum temperature | Lowest minimum temperature | Monthly range of temperarure |
|---|---|---|---|---|---|---|
| January | 22.87 | 8.25 | 15.56 | 25.6 | 4.4 | 14.62 |
| Feb. | 22.80 | 8.85 | 15.82 | 29.00 | 5.2 | 13.95 |
| March | 29.96 | 13.87 | 21.91 | 37.40 | 6.8 | 16.09 |
| April | 39.29 | 21.86 | 30.57 | 47.00 | 16.3 | 17.43 |
| May | 41.2 | 24.0 | 32.6 | 45.6 | 20.1 | 17.20 |
| June | 43.90 | 28.50 | 36.20 | 47.50 | 24.00 | 15.40 |
| July | 38.20 | 27.00 | 32.60 | 44.50 | 24.80 | 11.20 |
| August | 36.70 | 25.90 | 31.30 | 40.70 | 23.70 | 10.80 |
| Sept. | 37.93 | 23.66 | 30.79 | 41.20 | 19.90 | 14.27 |
| Oct. | 36.51 | 17.77 | 27.14 | 38.70 | 17.20 | 18.74 |
| Novr. | 29.83 | 16.83 | 23.33 | 34.30 | 13.50 | 13.00 |
| Decr. | 24.58 | 9.45 | 17.01 | 27.90 | 7.20 | 15.13 |

Source: Indian Meteorology Department, Jaipur.

# APPENDIX O-C

## Normal and actual rainfall of Bharatpur (1970-1979)

| Year | Normal rainfall | Actual rainfall | Deviation from normal rainfall | Percentage deviation |
|---|---|---|---|---|
| 1970 | 673.5 | 724.2 | +50.7 | +7.52 |
| 1973 | 673.5 | 681.0 | +8.0 | +1.18 |
| 1974 | 673.5 | 621.0 | -52.5 | -7.79 |
| 1975 | 673.5 | 700.5 | +27.0 | +4.00 |
| 1976 | 673.5 | 775.0 | +101.5 | +15.07 |
| 1977 | 673.5 | 948.0 | +274.5 | +40.75 |
| 1978 | 673.5 | 589.9 | -83.6 | -12.41 |
| 1979 | 673.5 | 285.9 | -389.6 | -57.84 |

Source: Director, Hydrology Department of Rajasthan, 1980.

# APPENDIX O-D

## Relative Humidity of Bharatpur

| Month | Relative humidityin percentage |  | Mean percentage |
|---|---|---|---|
|  | 8-30 Hrs | 17-30 Hrs |  |
| January | 79.9 | 52.05 | 65.97 |
| February | 81.38 | 45.00 | 63.19 |
| March | 58.51 | 30.35 | 44.43 |
| April | 40.49 | 16.06 | 28.26 |
| May | 38.50 | 24.12 | 31.31 |
| June | 47.23 | 30.6 | 38.91 |
| July | 71.93 | 59.25 | 65.59 |
| August | 68.32 | 49.31 | 58.81 |
| September | 58.73 | 35.5 | 47.11 |
| October | 49.61 | 26.38 | 37.99 |
| November | 71.36 | 52.03 | 61.69 |
| December | 78.83 | 47.32 | 63.07 |

Source : Indian Meteorology Department, Jaipur, Climatological Table of observation in India.

# APPENDIX 2-A

## Growth of seven cities and rank of Bharatpur city in Rajasthan (In class IInd)

| City | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 |
|---|---|---|---|---|---|---|---|---|
| Ganga Nagar | - | - | - | 9,943 | 16,136 | 36,437 | 63,854 | 90,042 |
| Sikar | 21,523 | 22,317 | 21,080 | 26,297 | 32,334 | 44,140 | 50,636 | 70,987 |
| Bharatpur | 43,601 | 33,918 | 33,495 | 30,173 | 35,541 | 37,321 | 49,776 | 68,036 |
| Beawar | 21,928 | 22,800 | 22,362 | 28,342 | 36,720 | 51,054 | 53,931 | 66,114 |
| Tonk | 38,759 | 33,864 | 30,374 | 35,798 | 38,650 | 42,833 | 43,413 | 55,866 |
| Churu | 15,657 | 16,038 | 16,932 | 21,965 | 28,269 | 40,047 | 41,727 | 52,502 |
| Bhilwara | 14,844 | 13,168 | 13,655 | 15,350 | 20,701 | 35,761 | 43,499 | 83,155 |

Sources :- Districts Census Hand Books., 1971

# APPENDIX 2-B

## Bharatpur city (wards) (1971)

| Ward No. | Area in hectares | Population | Density per hectare |
|---|---|---|---|
| 1 | 1,040 | 5,625 | 5.50 |
| 2 | 26 | 5,486 | 211.00 |
| 3 | 24 | 5,419 | 225.90 |
| 4 | 7 | 2,902 | 414.60 |
| 5 | 8 | 3,748 | 468.50 |
| 6 | 20 | 2,890 | 144.50 |
| 7 | 344 | 2,279 | 6.60 |
| 8 | 192 | 5,434 | 28.30 |
| 9 | 7 | 1,552 | 221.70 |
| 10 | 8 | 2,067 | 258.30 |
| 11 | 7 | 2,376 | 339.40 |
| 12 | 12 | 2,514 | 209.50 |
| 13 | 8 | 2,383 | 296.60 |
| 14 | 7 | 2,492 | 356.00 |
| 15 | 10 | 2,109 | 210.00 |
| 16 | 4 | 2,351 | 587.70 |
| 17 | 14 | 2,050 | 148.40 |

| | | | |
|---|---|---|---|
| 18 | 22 | 6,306 | 286.50 |
| 19 | 48 | 2,875 | 59.80 |
| 20 | 48 | 2,711 | 58.90 |
| 21 | 380 | 3,367 | 9.90 |
| Total Wards | Total area | Total population | |
| 21 | 2,234 hectares | 68,036 | 30.45 |

Source : Census 1971 Rajasthan, District Census Hand book of Bharatpur P-P, 108-113.

# APPENDIX 2-C

## Bharatpur city, wards (1974)

| Ward No. | Area in hectares | Population | Density per hectare |
|---|---|---|---|
| 1 | 1,446 | 3,609 | 2.40 |
| 2 | 652 | 3,369 | 5.20 |
| 3 | 216 | 2,912 | 13.50 |
| 4 | 10 | 2,013 | 201.30 |
| 5 | 30 | 2,155 | 65.40 |
| 6 | 2 | 2,002 | 1,101.00 |
| 7 | 14 | 2,158 | 154.10 |
| 8 | 6 | 2,290 | 381.60 |
| 9 | 7 | 2,520 | 360.00 |
| 10 | 12 | 3,097 | 258.00 |
| 11 | 8 | 2,951 | 368.90 |
| 12 | 14 | 2,172 | 155.10 |
| 13 | 50 | 3,284 | 64.70 |
| 14 | 36 | 2,402 | 69.20 |
| 15 | 3 | 2,109 | 703.00 |
| 16 | 4 | 2,351 | 585.20 |
| 17 | 8 | 2,523 | 315.40 |

|  |  |  |  |
|---|---|---|---|
| 18 | 34 | 2,000 | 58.90 |
| 19 | 344 | 2,478 | 7.50 |
| 20 | 284 | 2,502 | 8.90 |
| 21 | 20 | 3,246 | 162.30 |
| 22 | 10 | 3,060 | 306.00 |
| 23 | 10 | 1,809 | 180.90 |
| 24 | 224 | 1,815 | 8.50 |
| 25 | 3 | 1,810 | 603.30 |
| 26 | 8 | 2,172 | 271.50 |
| 27 | 10 | 2,067 | 285.30 |
| 28 | 108 | 2,376 | 237.60 |
| 29 | 4 | 1,894 | 473.40 |
| 30 | 4 | 2,383 | 595.70 |
| Total Wards | Total area | Total population | 21.48 |
| 30 | 3,483 hectares | 74,819 |  |

Source : Municipal Board Bharatpur, March, 1978.

# APPENDIX 2-D

## Occupational structure of Bharatpur city (1971)

| | Occupation | Male | Female | Total | Percentage of total population | Percentage of total worker |
|---|---|---|---|---|---|---|
| (i) | Non workers | 21,212 | 29,889 | 51,101 | 75.10 | - |
| (2) | Total workers | 15,971 | 964 | 16,935 | 24.89 | 100.00 |
| i. | Cultivators | 624 | 60 | 684 | 01.00 | 4.03 |
| ii. | Agricultural labours | 357 | 28 | 385 | .56 | 2.20 |
| iii. | House Hold Industrial workers | 819 | 181 | 1,000 | 1.46 | 5.90 |
| iv. | Other than house hold Industries | 2,468 | 26 | 2,494 | 3.70 | 14.70 |
| v. | Construction | 815 | 14 | 829 | 1.20 | 4.60 |
| vi. | Trade and Commerce | 3,344 | 37 | 3,381 | 4.90 | 19.90 |
| vii. | Transport | 1,847 | 11 | 1,858 | 2.70 | 10.90 |
| viii. | Other Services | 5,702 | 609 | 6,311 | 9.20 | 37.20 |

Source: Census 1971 Rajasthan, District Hand book of Bharatpur.

# APPENDIX 2-E

## Communitywise distribution and their percentage of the total pupulation, 1901-1971

| Year | Total population of the city | Hindu | Percentage of the total population | Muslim | Percentage of the total population | Jain | Percentage of the total population | Sikhs | Christian | Others |
|---|---|---|---|---|---|---|---|---|---|---|
| 1901 | 43,601 | 30,781 | 70.40 | 11,964 | 27.30 | 722 | 1.70 | - | - | 131 |
| 1921 | 33,495 | 21,975 | 65.60 | 10,639 | 31.80 | 435 | 1.30 | 15 | 334 | 97 |
| 1931 | 30,173 | 20,216 | 67.10 | 9,117 | 30.20 | 435 | 1.40 | 40 | 363 | 2 |
| 1941 | 35,541 | 24,597 | 69.20 | 10,095 | 28.40 | 620 | 1.70 | - | - | 103 |
| 1951 | 37,321 | 34,016 | 91.20 | 2,388 | 6.40 | 486 | 1.30 | 242 | 13 | - |
| 1961 | 49,776 | 46,311 | 93.20 | 1,126 | 2.30 | 540 | 1.10 | 1,663 | 38 | - |
| 1971 | 68,036 | 62,694 | 92.10 | 2,183 | 3.20 | 1,142 | 1.70 | 1,885 | 94 | 36 |

Sources :
(i) Bharatpur State Annual Reports 1901, 1921 and 1931.
(ii) Census Hand books Bharatpur 1961 and 1971.

# APPENDIX 2-F

## Literacy in Bharatpur city ( 1901-1971 )

| Year | Total population of the city | Total literacy per cent | Total male population | Male literacy per cent | Total female population | Female literacy per cent |
|---|---|---|---|---|---|---|
| 1901 | 43,601 | 10.20 | 23,703 | 18.20 | 19,898 | 0.90 |
| 1921 | 33,495 | 12.10 | 19,268 | 18.90 | 14,227 | 3.50 |
| 1931 | 30,173 | 15.90 | 16,736 | 23.50 | 13,437 | 5.60 |
| 1941 | 35,541 | 22.40 | 19,486 | 36.80 | 16,055 | 7.50 |
| 1951 | 37,321 | 22.50 | 21,228 | 35.00 | 16,093 | 12.50 |
| 1961 | 49,776 | 38.20 | 27,850 | 50.00 | 21,971 | 22.70 |
| 1971 | 68,036 | 47.90 | 37,183 | 56.70 | 30,853 | 33.30 |

Source: District Census Hand Book of Bharatpur 1971.

# Appendix 2-G
## Correlation Matrix
### (Zone I)

| S.No. | Population Density 1 | Population Growth 2 | Sex ratio 3 | Dependency ratio 4 | Literacy rate 5 | Scheduled caste 6 | Scheduled tribes 7 | Total workers 8 | Primary workers 9 | Secondary workers 10 | Tertiary workers 11 | Educational facility 12 | Medical facility 13 | Infra structure 14 | House Density (per sq. km.) 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 1.000 | | | | | | | | | | | | | | |
| 2. | 0.692 | 1.000 | | | | | | | | | | | | | |
| 3. | -0.349 | -0.884 | 1.000 | | | | | | | | | | | | |
| 4. | 0.315 | 0.827 | -0.740 | 1.000 | | | | | | | | | | | |
| 5. | 0.548 | -0.013 | 0.477 | -0.020 | 1.000 | | | | | | | | | | |
| 6. | -0.987** | -0.572 | 0.202 | -0.182 | -0.635 | 1.000 | | | | | | | | | |
| 7. | 0.984 | 0.596 | -0.201 | 0.259 | 0.684 | -0.993* | 1.000 | | | | | | | | |
| 8. | -0.457 | 0.325 | -0.631 | 0.614 | -0.732 | 0.589 | -.555 | 1.000 | | | | | | | |
| 9. | -0.938 | -0.705 | 0.299 | -0.501 | -0.685 | 0.920 | -0.957** | 0.358 | 1.000 | | | | | | |
| 10. | -0.840 | -0.605 | 0.478 | -0.057 | -0.100 | 0.817 | -0.756 | 0.358 | 0.610 | 1.000 | | | | | |
| 11. | 0.975** | 0.729 | -0.346 | 0.455 | 0.626 | -0.921 | 0.977** | -0.378 | -0.991* | -0.710 | 1.000 | | | | |
| 12. | -0.601 | -0.910 | 0.939 | -0.592 | 0.304 | 0.481 | -0.459 | -0.332 | 0.479 | 0.749 | -0.552 | 1.000 | | | |
| 13. | -0.230 | 0.431 | -0.496 | 0.848 | -0.237 | 0.346 | -0.257 | 0.835 | -0.024 | 0.451 | -0.053 | -0.206 | 1.000 | | |
| 14. | -0.250 | -0.919 | 0.646 | -0.844 | -0.349 | 0.680 | -0.736 | -0.128 | 0.879 | 0.473 | -0.861 | 0.686 | -0.447 | 1.000 | |
| 15. | 0.996* | 0.626 | -0.270 | 0.233 | 0.591 | -0.997* | 0.990* | -0.533 | -0.926 | -0.836 | 0.964** | -0.540 | -0.303 | -0.715 | 1.000 |

* At 2 per cent level of significance.

** At 5 per cent level of significance.

# Appendix 2-H
## Correlation matrix
## (Zone II)

| | Population Density | Population Growth | Sex ratio | Dependency ratio | Literacy rate | Scheduled caste | Scheduled tribes | Total workers | Primary workers | Secondary workers | Tertiary workers | Educational facility | Medical facility | Infra structure | House Density (per sq. km.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 1.000 | | | | | | | | | | | | | | |
| 2. | -0.318 | 1.000 | | | | | | | | | | | | | |
| 3. | 0.752 | -0.711 | 1.000 | | | | | | | | | | | | |
| 4. | 0.027 | 0.125 | -0.266 | 1.000 | | | | | | | | | | | |
| 5. | 0.280 | 0.770 | -0.113 | 0.890** | 1.000 | | | | | | | | | | |
| 6. | 0.361 | -0.016 | 0.408 | -0.007 | 0.376 | 1.000 | | | | | | | | | |
| 7. | -0.907** | 0.612 | -0.888** | 0.170 | 0.045 | -0.133 | 1.000 | | | | | | | | |
| 8. | 0.588 | -0.766 | 0.633 | -0.674 | -0.418 | 0.306 | -0.643 | 1.000 | | | | | | | |
| 9. | -0.211 | -0.794 | 0.427 | -0.756 | -0.788 | 0.106 | -0.106 | 0.379 | 1.000 | | | | | | |
| 10. | -0.824** | 0.549 | -0.833** | 0.110 | -0.022 | -0.365 | 0.785 | -0.721 | -0.209 | 1.000 | | | | | |
| 11. | -0.652 | 0.729 | -0.928* | 0.217 | 0.020 | -0.132 | 0.873** | -0.606 | -0.417 | 0.890** | 1.000 | | | | |
| 12. | -0.526 | 0.352 | 0.264 | -0.661 | 0.791 | 0.439 | -0.305 | 0.081 | -0.543 | -0.585 | -0.285 | 1.000 | | | |
| 13. | 0.097 | -0.539 | 0.065 | -0.869** | -0.639 | 0.069 | -0.110 | 0.619 | 0.368 | 0.084 | 0.073 | -0.586 | 1.000 | | |
| 14. | 0.563 | -0.583 | 0.518 | -0.656 | -0.264 | 0.564 | -0.483 | 0.888** | 0.288 | -0.482 | -0.330 | 0.017 | 0.756 | 1.000 | |
| 15. | 0.974* | -0.206 | 0.689 | 0.065 | 0.382 | -0.494 | -0.811 | 0.523 | -0.262 | -0.611 | -0.517 | 0.532 | 0.125 | 0.601 | 1.000 |

* At 1 per cent level of significance.

** At 5 per cent level of significance.

## Appendix 2-I
## Correlation Matrix
## (Zone III)

| | Population Density | Population Growth | Sex ratio | Dependency ratio | Literacy rate | Scheduled caste | Scheduled tribes | Total workers | Primary workers | Secondary workers | Tertiary workers | Educational facility | Medical facility | Infra structure | House Density (per sq. km.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 1.000 | | | | | | | | | | | | | | |
| 2. | -0.553 | 1.000 | | | | | | | | | | | | | |
| 3. | -0.062 | 0.210 | 1.000 | | | | | | | | | | | | |
| 4. | 0.759 | -0.882** | -0.071 | 1.000 | | | | | | | | | | | |
| 5. | 0.598 | -0.961* | -0.111 | 0.880** | 1.000 | | | | | | | | | | |
| 6. | -0.187 | 0.468 | 0.495 | -0.514 | -0.257 | 1.000 | | | | | | | | | |
| 7. | -0.865** | 0.374 | -0.023 | -0.437 | -0.446 | -0.196 | 1.000 | | | | | | | | |
| 8. | 0.954* | -0.596 | -0.179 | 0.824** | 0.668 | -0.250 | -0.728 | 1.000 | | | | | | | |
| 9. | -0.949* | 0.444 | -0.134 | -0.724 | -0.560 | 0.006 | 0.797 | -0.941* | 1.000 | | | | | | |
| 10. | 0.957* | -0.475 | 0.107 | 0.630 | 0.546 | 0.051 | -0.957* | 0.852** | -0.921* | 1.000 | | | | | |
| 11. | 0.905** | -0.412 | 0.138 | 0.729 | 0.541 | -0.029 | -0.698 | 0.935* | -0.987* | 0.850** | 1.000 | | | | |
| 12. | 0.922* | -0.636 | 0.003 | 0.789 | 0.760 | 0.009 | -0.811** | 0.942* | -0.946* | 0.902** | 0.923* | 1.000 | | | |
| 13. | 0.580 | -0.295 | 0.288 | 0.555 | 0.519 | 0.274 | -0.416 | 0.700 | -0.789 | 0.559 | 0.847** | 0.789 | 1.000 | | |
| 14. | 0.683 | -0.395 | 0.146 | 0.594 | 0.611 | 0.273 | -0.570 | 0.784 | -0.840** | 0.671 | 0.871** | 0.884** | 0.971* | 1.000 | |
| 15. | 0.990* | -0.562 | -0.540 | 0.736 | 0.581 | -0.206 | -0.889** | 0.910** | -0.909** | 0.965* | 0.847** | 0.882** | 0.481 | 0.594 | 1.000 |

* At 1 per cent level of significance.

** At 5 per cent level of significance.

## Appendix 2-J
## Correlation Matrix
## (Zone IV)

| | Population Density | Population Growth | Sex ratio | Dependency ratio | Literacy rate | Scheduled caste | Scheduled tribes | Total workers | Primary workers | Secondary workers | Tertiary workers | Educational facility | Medical facility | Infra structure | House Density (per sq. km.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 1.000 | | | | | | | | | | | | | | |
| 2. | -0.034 | 1.000 | | | | | | | | | | | | | |
| 3. | 0.100 | -0.620 | 1.000 | | | | | | | | | | | | |
| 4. | -0.484 | -0.453 | -0.129 | 1.000 | | | | | | | | | | | |
| 5. | 0.526 | -0.605 | 0.453 | -0.110 | 1.000 | | | | | | | | | | |
| 6. | -0.114 | -0.428 | 0.805 | 0.103 | 0.427 | 1.000 | | | | | | | | | |
| 7. | -0.453 | -0.707 | 0.465 | 0.636 | -0.123 | 0.277 | 1.000 | | | | | | | | |
| 8. | 0.711 | -0.266 | -0.072 | -0.228 | 0.816** | -0.143 | -0.451 | 1.000 | | | | | | | |
| 9. | -0.437 | -0.155 | 0.525 | 0.237 | 0.115 | 0.901* | 0.214 | -0.396 | 1.000 | | | | | | |
| 10. | 0.411 | 0.098 | 0.304 | -0.768 | -0.053 | -0.229 | -0.077 | 0.026 | -0.462 | 1.000 | | | | | |
| 11. | 0.329 | 0.135 | -0.708 | 0.035 | -0.106 | -0.918** | -0.211 | 0.435 | -0.937* | 0.123 | 1.000 | | | | |
| 12. | 0.921* | -0.337 | 0.211 | -0.366 | 0.765 | -0.043 | -0.299 | 0.874** | -0.421 | 0.344 | 0.337 | 1.000 | | | |
| 13. | -0.093 | -0.451 | 0.742 | -0.221 | 0.597 | 0.680 | 0.115 | 0.162 | 0.511 | 0.175 | -0.640 | 0.141 | 1.000 | | |
| 14. | 0.360 | 0.215 | 0.513 | -0.697 | 0.359 | 0.589 | -0.480 | 0.116 | 0.466 | 0.302 | -0.640 | 0.255 | 0.564 | 1.000 | |
| 15. | 0.839 | 0.258 | -0.147 | -0.525 | -0.009 | -0.425 | -0.362 | 0.319 | -0.627 | 0.528 | 0.495 | 0.615 | -0.505 | 0.115 | 1.000 |

## Appendix 2-K
## Correlation matrix
## (Zone V)

| | Population Density | Population Growth | Sex ratio | Dependency ratio | Literacy rate | Scheduled caste | Scheduled tribes | Total workers | Primary workers | Secondary workers | Tertiary workers | Educational facility | Medical facility | Infra structure | House Density (per sq. km.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. | 1.000 | | | | | | | | | | | | | | |
| 2. | -0.061 | 1.000 | | | | | | | | | | | | | |
| 3. | 0.390 | 0.022 | 1.000 | | | | | | | | | | | | |
| 4. | 0.853 | 0.405 | 0.295 | 1.000 | | | | | | | | | | | |
| 5. | 0.133 | -0.394 | -0.799 | -0.033 | 1.000 | | | | | | | | | | |
| 6. | 0.530 | -0.743 | 0.553 | 0.832 | -0.547 | 1.000 | | | | | | | | | |
| 7. | 0.140 | 0.694 | 0.727 | 0.437 | -0.894 | 0.856 | 1.000 | | | | | | | | |
| 8. | -0.218 | -0.932 | -0.342 | -0.660 | 0.563 | -0.931 | -0.859 | 1.000 | | | | | | | |
| 9. | -0.768 | -0.573 | -0.468 | -0.966** | 0.285 | 0.942 | -0.651 | 0.792 | 1.000 | | | | | | |
| 10. | 0.994* | 0.047 | 0.397 | 0.904 | 0.084 | 0.614 | -0.220 | -0.321 | -0.832 | 1.000 | | | | | |
| 11. | 0.694 | 0.655 | 0.456 | 0.943 | -0.338 | -0.968** | 0.705 | -0.853 | -0.994* | 0.768 | 1.000 | | | | |
| 12. | 0.945 | 0.157 | 0.601 | -0.902 | 0.179 | 0.751 | -0.453 | -0.467 | 0.898 | 0.965** | 0.848 | 1.000 | | | |
| 13. | 0.922 | 0.203 | 0.632 | 0.903 | -0.237 | 0.788 | 0.510 | -0.514 | -0.914 | 0.947 | 0.870 | 0.997* | 1.000 | | |
| 14. | 0.946 | -0.378 | 0.308 | 0.645 | -0.300 | 0.236 | -0.127 | 0.108 | -0.520 | 0.905 | 0.425 | 0.813 | 0.775 | 1.000 | |
| 15. | 0.998* | -0.023 | 0.358 | 0.874 | 0.150 | 0.548 | 0.142 | -0.246 | -0.785 | 0.996* | 0.715 | 0.944 | 0.921 | 0.934 | 1.000 |

# APPENDIX 3-A

## Mohallas within the circular road, 1978.

| Name of Mohalla | Area in Hectares |
|---|---|
| 1. Machli Mohalla | 3.50 |
| 2. Phool wadi Mohalla | 3.50 |
| 3. Katen Mohall | 4.00 |
| 4. Baraf Factory Mohalla | 1.50 |
| 5. Gopal Garh | 11.00 |
| 6. Jagina Darwaja | 2.50 |
| 7. Jatwa Mohalla | 2.00 |
| 8. Mali Mohalla | 2.50 |
| 9. Gulal Kund Mohalla | 2.75 |
| 10. Goa; bagh Road | 4.50 |
| 11. Thakuro Ka Mohalla | 4.50 |
| 12. Rasala Mohalla | 3.50 |
| 13. Hospital Area | 3.00 |
| 14. Machio Ka Mohalla | 2.00 |
| 15. Jagratha Ka Mohalla | 1.50 |
| 16. Nai Basti | 1.50 |
| 17. Top Mohalla | 5.00 |
| 18. Chita Wali Gali | 0.50 |
| 19. Pans Walo Ka Mohalla | 2.00 |
| 20. Naswario Ka Ghar | 4.00 |
| 21. Bahadur Singh Ki Gali | 2.00 |
| 22. Singh Sardar Ki Gal | 1.50 |
| 23. Gurjaro Ka Mohalla | 2.50 |
| 24. Jatow Ka Mohalla | 6.50 |
| 25. Chota Mahadev | 2.50 |
| 26. Buddha Ki Hatt | 1.50 |
| 27. Kasaio Ka Mohalla | 2.75 |
| 28. Atal Bund Gate | 5.00 |
| 29. Dhimar Mohalla | 2.00 |
| 30. Ahiro Ka Mohalla | 2.00 |
| 31. More Mohalla | 3.00 |
| 32. Mohalla Carnal Ghamandi Singh Ka | 2.00 |
| 33. Korio Ka Mohalla | 2.50 |
| 34. Mali Ka Mohalla | 3.00 |
| 35. Kotwali Chouraya | 1.50 |
| 36. Cher Balamgaria | 1.50 |
| 37. Harizan Basti | 2.00 |
| 38. Pratap Singh Colongy | 1.75 |
| 39. Kunda Roopram | 3.75 |

| | | |
|---|---|---|
| 40. | Digya Para | 3.50 |
| 41. | Mohalla Badabash | 0.50 |
| 42. | West Kumber gate | 2.00 |
| 43. | Jatwa Mohalla | 3.50 |
| 44. | Malio Ka Mohalla | 1.00 |
| 45. | Namak Ka Katla | 9.50 |
| 46. | Barag Pura Mohalla | 2.00 |
| 47. | Kaysth Colony | 2.50 |
| 48. | Adarsh Colony | 2.00 |
| 49. | Mohalla Pahi Bagh | 2.75 |
| 50. | Chipto-Ka Mohalla | 2.00 |
| 51. | Khimi Ghat | 3.50 |
| 52. | Pirohit Mohalla | 3.50 |
| 53. | Nadia Mohalla | 5.50 |
| 54. | Dahi Wali Gali | 1.00 |
| 55. | Jati Mohalla | 2.50 |
| 56. | Biyarian Mohalla | 2.00 |
| 57. | kherpati Mohalla | 1.75 |
| 58. | Roopla Paisa | 2.00 |
| 59. | Sundi Wala Mohalla | 1.00 |
| 60. | Radha Raman Mohalla | 1.00 |
| 61. | Surdass Ka Gher | 0.75 |
| 62. | Arya Samaj Road | 1.75 |
| 63. | Moot Ki Gali | 0.50 |
| 64. | Gudadi Ka Mohalla | 2.00 |
| 65. | Moji Wala Mohalla | 1.00 |
| 66. | Barsniya Mohalla | 1.50 |
| 67. | Mohalla Nanga Khawash | 2.00 |
| 68. | Sirki Pada | 2.50 |
| 69. | Nawab Sahib Ki Gali | 1.00 |
| 70. | Chouburja | 2.50 |
| 71. | Ganga Mandir Area | 2.50 |
| 72. | Jama Maszid Area | 1.00 |
| 73. | Gowerdhan Gate Area | 3.00 |
| 74. | Chamndpole Area | 2.00 |
| 75. | Kumher Gate Area | 2.00 |
| 76. | Anah Gate Area | 2.00 |
| 77. | Mathur Gate Area | 1.50 |
| 78. | Suraj Pole Area | 1.50 |
| 79. | Bassan Gate Area | 2.00 |
| 80. | Purana Post Office | 2.50 |
| 81. | Girraj Colony (Inside the fort) | 3.00 |
| 82. | Atal Bund Mandi | 3.50 |

# APPENDIX3-B

## Lorenz Curve (Zone wise)

| Distance from Bharatpur | Percentage of the settlements | Cumulative percentage (xi) | Percentage of area | Cumulative percentage (Yi) |
|---|---|---|---|---|
| up to 6 kms. | 5.00 | 5.00 | 5.47 | 5.47 |
| 6 to 12 kms. | 25.56 | 30.56 | 19.64 | 25.11 |
| 12 to 18 kms. | 32.96 | 63.52 | 32.69 | 57.80 |
| 18 to 24 kms. | 36.48 | 100.00 | 42.20 | 100.00 |

# APPENDIX 3-C

## Nearest Neighbour Distance (Distribution of settlements in the region)

| Distance from the city | N | Er | $r\bar{a}$ | A | P | $r\bar{e}$ | $R\frac{\overline{ra}}{\overline{re}}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 27 | 31.5 | 1.16 | 94.5 | 0.2857 | 0.94 | 1.2340 |
| 6 to 12 kms. | 138 | 142.5 | 1.03 | 338.9 | 0.4071 | 0.89 | 1.3205 |
| 12 to 18 kms. | 178 | 209.5 | 1.17 | 564.2 | 0.3154 | 0.97 | 1.3146 |
| 18 TO 24 kms. | 196 | 224.5 | 1.14 | 728.5 | 0.2690 | 0.90 | 1.1752 |
| Whole environs | 539 | 630.5 | 1.16 | 1726.1 | 0.3122 | 0.90 | 1.2888 |

# APPENDIX 3-D

## Nearest Neighbour Distance (Settlements with population less than 200)

| Distance from the city | N | Er | $\overline{ra}$ | A | P | $\overline{re}$ | $R\frac{\overline{ra}}{\overline{re}}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 4 | 11.75 | 2.93 | 94.5 | 0.0423 | 2.43 | 1.2057 |
| 6 to 12 kms. | 28 | 36.00 | 1.28 | 338.9 | 0.0826 | 1.74 | 0.7356 |
| 12 to 18 kms. | 33 | 58.50 | 1.77 | 564.2 | 0.0584 | 2.06 | 0.8592 |
| 18 to 24 kms. | 20 | 64.00 | 3.20 | 728.5 | 0.0274 | 3.02 | 1.0596 |

# APPENDIX 3-E

## Nearest Neighbour Distance (Settlements with population 200 to 499)

| Distance from the city | N | Er | $\bar{ra}$ | A | P | $re$ | $R\frac{\bar{ra}}{re}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 4 | 5.00 | 1.25 | 94.5 | 0.0423 | 2.43 | 0.5144 |
| 6 to 12 kms. | 40 | 59.00 | 1.47 | 338.9 | 0.1180 | 1.45 | 1.0137 |
| 12 to 18 kms. | 59 | 99.00 | 1.67 | 564.2 | 0.1045 | 1.54 | 1.0844 |
| 18 to 24 kms. | 35 | 72.00 | 2.05 | 728.5 | 0.0480 | 2.28 | 0.8991 |

# APPENDIX 3-F

## Nearest Neighbour Distance (Settlements with population 500 to 999)

| Distance from the city | N | Er | $\bar{ra}$ | A | P | $\bar{re}$ | $R=\frac{\bar{ra}}{\bar{re}}$ |
|---|---|---|---|---|---|---|---|
| Up to 6 kms. | 11 | 19.00 | 1.72 | 94.5 | 0.1164 | 1.46 | 1.1700 |
| 6 to 12 kms. | 31 | 50.50 | 1.62 | 338.9 | 0.0914 | 1.65 | 0.9818 |
| 12to18 kms. | 40 | 79.00 | 1.97 | 564.2 | 0.0708 | 1.87 | 1.0534 |
| 18to24 kms. | 64 | 104.00 | 1.62 | 728.5 | 0.0878 | 1.68 | 0.9642 |

## Appendix 3-G

### Nearest Neighbour Distance
(Settlements with population 1000 to 1999)

| Distance from the city | N | Er | $\overline{ra}$ | A | P | $\overline{re}$ | $R=\frac{\overline{ra}}{\overline{re}}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 3 | 19.00 | 6.33 | 94.5 | 0.0317 | 2.80 | 2.2607 |
| 6 to 12 kms. | 13 | 49.00 | 3.26 | 338.9 | 0.0442 | 2.38 | 1.3697 |
| 12 to 18 kms. | 25 | 77.25 | 3.09 | 564.2 | 0.0443 | 2.38 | 1.2983 |
| 18 to 24 kms. | 47 | 108.50 | 2.30 | 728.5 | 0.0645 | 1.97 | 1.1675 |

# APPENDIX 3-H

## Nearest Neighbour Distance (Settlements with population 2000 to 4999)

| Distance from the city | N | Er | $r\bar{a}$ | A | P | $\bar{re}$ | $R=\frac{\bar{ra}}{\bar{re}}$ |
|---|---|---|---|---|---|---|---|
| Up to 6 kms. | 2 | 16 | 8.00 | 94.5 | 0.0211 | 3.44 | 2.3255 |
| 6 to 12 kms. | 3 | 24 | 8.00 | 338.9 | 0.0088 | 5.34 | 1.4981 |
| 12 to 18 kms. | 11 | 51 | 6.63 | 564.2 | 0.0194 | 3.59 | 1.2896 |
| 18 to 24 Kms. | 15 | 103.5 | 6.9 | 728.5 | 0.0205 | 3.49 | 1.9770 |

# APPENDIX 3-I

## Nearest Neighbour Distance Settlements with population Above 5000)

| Distance from the city | N | Er | $r\bar{a}$ | A | P | $\bar{re}$ | $R=\frac{\overline{ra}}{\overline{re}}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 1 | - | - | - | - | - | - |
| 6 to 12 kms. | - | - | - | - | - | - | - |
| 12 to 18 kms. | 2 | 34 | 17 | 564.2 | 0.0035 | 8.47 | 2.0070 |
| 18 to 24 kms. | 1 | - | - | - | - | - | - |

# APPENXID 3-J

## Nearest Neighbour Distance (Unpopulated settlements)

| Distance from the city | N | Er | $r\bar{a}$ | A | P | $r\bar{e}$ | $R = \frac{r\bar{a}}{r\bar{e}}$ |
|---|---|---|---|---|---|---|---|
| Upto 6 kms. | 2 | 22 | 11 | 94.5 | 0.0211 | 3.44 | 3.1976 |
| 6 to 12 kms. | 21 | 39 | 1.85 | 338.9 | 0.0619 | 3.01 | 0.9213 |
| 12 to 18 kms. | 8 | 35 | 4.37 | 564.2 | 0.0141 | 4.21 | 1.0380 |
| 18 to 24 kms. | 14 | 61 | 4.35 | 728.5 | 0.0192 | 3.61 | 1.2049 |

Appendix 4 - A

Artical Wise Number of Shops within hte Walled City, 1978

| Household Articles | NAME OF MARKET CENTRES | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inner Kumher gate | Kotawali Shopping Centre | Bajaj Bazar | Laxman Mandir Shopping Centre | Dahi Wali gali | Saraffa Bazar | Purana Post Office | Zama Maszid Shopping Centre | Loha Bazar | Ganga Mandir | Shopping Centre Chouburja | Hospital Road | Mathura Gate | Atal Band Mandi | Bassan Gate | Pahi Bagh Shopping Centre | Budh Ki Haat | Delhi Gate Shopping Centre | Purani Sabji Mandi | Inner Gowerdhan Gate | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 1. Furniture | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 3 | - | - | 5 |
| 2. Electrical goods | 3 | - | 2 | - | - | 1 | 4 | - | - | 1 | - | 4 | - | - | 1 | - | - | - | - | - | 16 |
| 3. Radio | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 4. Crockery | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 5. Cement | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | - | 6 |
| 6. Woods | - | - | - | - | - | - | - | - | - | 10 | - | 1 | - | - | - | - | - | - | - | - | 11 |
| 7. Iron & Hardware | 3 | - | 1 | - | - | - | 1 | 1 | 24 | 4 | - | 2 | - | - | - | - | - | - | - | - | 36 |
| 8. Paints | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 5 | - | - | - | - | - | 6 |
| 9. Musical Instruments | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10. Stone | - | - | - | - | - | - | - | - | - | - | 1 | 3 | - | - | - | - | - | - | - | - | 4 |
| 11. Sports | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 12. Utensil | 1 | 1 | 1 | - | - | - | 1 | - | 11 | 3 | - | - | 1 | - | 1 | - | - | - | - | - | 20 |
| 13. Coal | - | - | - | - | - | - | 1 | - | - | - | - | 1 | - | - | - | - | - | - | - | - | 2 |
| 14. Kerosene | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 2 | 2 | - | - | - | - | - | 6 |
| 15. Rop & Ban | - | - | 4 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - | - | - | - | - | 7 |
| 16. Cycle | - | 2 | - | - | - | 1 | 2 | - | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 11 |
| 17. Sewing machine | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 18. Sanitary ware | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 |
| 19. Soil Article | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| 20. Fertilizer | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| 21. Gas Slinder | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 22. Soap | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 2 |
| Total | 14 | 3 | 11 | 2 | - | 2 | 9 | 1 | 36 | 26 | 1 | 11 | 2 | 2 | 14 | - | - | 3 | - | - | 140 |

## Appendix 4 - B

### Article wise number of shops within the walled city, 1978

|  | NAME OF MARKET CENTRES |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Food Artocals | Inner Kumher gate | Kotawali Shopping Centre | Bajaj Bazar | Laxman Mandir Shopping Centre | Dahi Wali gali | Saraffa Bazar | Purana Post Office | Zama Maszid Shopping Centre | Loha Bazar | Ganga Mandir Shopping Centre | Chouburja | Hospital Road | Mathura Gate | Atal Band Mandi | Bassan Gate | Pahi Bagh Shopping Centre | Budh Ki Haat | Delhi Gate Shopping Centre | Purani Sabji Mandi | Inner Gowerdhan Gate | Total |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| 1. Grain | 3 | 1 | - | 4 | - | 1 | - | - | - | 4 | - | - | - | 28 | - | - | - | - | - | - | 41 |
| 2. Parchun | 13 | 4 | 6 | 3 | 1 | 4 | 5 | 7 | - | 10 | 3 | 3 | 4 | 34 | 13 | 5 | 10 | - | 2 | - | 127 |
| 3. Namkeen | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 3 |
| 4. Wine | 1 | - | - | - | - | - | 1 | 2 | - | - | - | - | - | - | 1 | - | - | - | - | 1 | 6 |
| 5. Sweets | 11 | 6 | 4 | 8 | 8 | - | 2 | - | 1 | 4 | 3 | 5 | 1 | 4 | 8 | 1 | 5 | - | 1 | - | 72 |
| 6. Restaurant | 7 | 2 | 2 | 2 | 1 | - | 2 | - | - | 6 | 2 | 2 | 1 | 3 | 1 | 1 | 3 | 3 | - | - | 38 |
| 7. Vegetable | 5 | - | - | 4 | - | - | - | 31 | - | 1 | - | - | - | - | - | 1 | - | - | 28 | - | 70 |
| 8. Fruits | - | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 9. Meat | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| 10. Pickle & Juice | 2 | 1 | - | 1 | - | - | 1 | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 7 |
| 11. Ghee & Oil | 2 | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - | 1 | 1 | - | 1 | - | - | - | 8 |
| 12. Smoking | 4 | 4 | - | 4 | 1 | 2 | 2 | - | 1 | 3 | 3 | 2 | 3 | 1 | 11 | 2 | 1 | - | - | 1 | 45 |
| 13. Hotel | 3 | 1 | 2 | 1 | - | - | 3 | 2 | - | - | 5 | - | - | 1 | 3 | - | - | - | - | - | 21 |
| 14. Eating house | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 15. Bakery | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 1 | - | - | 2 | - | - | 4 |
| 16. Flour Mill | 2 | - | - | 1 | - | - | - | - | - | 2 | - | 2 | 1 | 1 | 2 | - | 1 | - | - | - | 12 |
| 17. Gur Bura | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 3 | - | - | - | - | - | - | 4 |
| 18. Tea store | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 19. Tobacco | 1 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 4 |
| 20. Chat | - | 1 | - | - | - | 1 | - | - | - | - | 1 | - | - | 1 | - | - | - | - | - | - | 4 |
| 21. Ice depot | - | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 4 |
| 22. Pansari | 1 | 2 | 4 | 10 | 3 | - | 1 | 2 | - | 7 | 9 | - | - | - | - | - | - | - | - | - | 39 |
| 23. Fooder | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 24. Bhadbhuja | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | 2 |
| 25. Mawa | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | 55 | 23 | 19 | 43 | 15 | 8 | 18 | 44 | 2 | 39 | 28 | 16 | 11 | 80 | 43 | 10 | 22 | 5 | 32 | 2 | 515 |

Appendix 4 — C

## Article Wise Number of Shops within the Walled City, 1978

| Service | NAME OF MARKET CENTRES | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inner Kumher gate | Kotawali Shopping Centre | Bajaj Bazar | Laxman Mandir Shopping Centre | Dahi Wali gali | Saraffa Bazar | Purana Post Office | Zama Maszid Shopping Centre | Loha Bazar | Ganga Mandir Shopping Centre | Chouburja | Hospital Road | Mathura Gate | Atal Band Mandi | Bassan Gate | Pahi Bagh Shopping Centre | Budh Ki Haat | Delhi Gate Shopping Centre | Purani Sabji Mandi | Inner Gowerdhan Gate | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 1. Hair dresser | 2 | 4 | - | 2 | - | - | - | - | - | - | 4 | - | 1 | 3 | 2 | 1 | 2 | - | - | 2 | 23 |
| 2. Dryclean | 4 | - | - | - | - | - | - | - | - | 2 | - | 2 | 2 | 1 | 1 | 1 | - | - | - | - | 13 |
| 3. Tailor | 3 | 1 | 10 | 1 | 1 | - | 1 | 1 | - | 4 | 4 | 5 | 6 | 6 | 6 | 1 | 4 | 1 | - | - | 55 |
| 4. Goldsmith | - | - | 1 | 3 | 27 | 13 | - | - | - | - | 2 | 1 | 1 | 4 | 2 | - | - | - | 1 | - | 55 |
| 5. Blacksmith | 1 | 4 | - | - | - | - | - | - | 1 | 3 | - | - | 4 | - | - | - | - | - | - | - | 13 |
| 6. Welding | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 4 |
| 7. Typing | - | - | - | - | - | - | - | - | - | - | - | | - | - | - | - | - | - | - | - | - |
| 8. Dyeing | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - |
| 9. Ginning | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | - | - | - | - | - | - | 4 |
| 10. Medical | - | - | - | - | - | - | - | 2 | - | 5 | - | 1 | - | 2 | 8 | 1 | 4 | - | 1 | - | 37 |
| 11. Dispensary | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12. P. Press | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - |
| 13. Cycle Repair | 10 | 7 | 1 | 1 | - | 1 | 1 | - | - | 4 | 3 | 4 | - | 9 | 4 | 2 | 2 | - | - | 1 | 51 |
| 14. Watch Repair | 7 | 1 | 1 | 1 | - | 4 | - | - | 1 | 2 | 2 | - | 2 | - | 3 | - | - | - | - | - | 24 |
| 15. Radio Repair | 4 | - | - | - | - | 1 | - | - | - | 1 | 2 | 3 | 2 | 2 | 2 | - | 1 | - | - | - | 18 |
| 16. Machine Repair | 6 | - | 1 | - | - | - | - | - | - | 3 | 1 | | - | - | - | - | 1 | 1 | - | 1 | 15 |
| 17. Typre retreading | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 18. Carpainter | - | - | - | - | - | - | - | 1 | - | 21 | - | - | - | - | - | - | - | - | - | - | 22 |
| 19. Sets Repair | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 20. Kharadwork | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| 21. Transport | - | - | - | - | - | - | - | - | - | - | - | - | - | -- | - | - | - | - | - | - | - |
| 22. Painter | - | - | - | 1 | - | - | - | 1 | - | 1 | - | 1 | - | - | 4 | - | - | - | - | - | 6 |
| 23. Tent House | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - | 1 | - | - | - | - | - | 3 |
| 24. Petrol Pump | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 25. Shoe Repair | 2 | - | - | - | - | - | 5 | - | - | - | - | 2 | 6 | - | - | - | - | - | - | 1 | 16 |
| 26. Commission Agent | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | 46 | 17 | 21 | 13 | 28 | 19 | 7 | 5 | 2 | 53 | 18 | 21 | 25 | 27 | 35 | 6 | 14 | 2 | 2 | 5 | 366 |

## Appendix 4 - D

### Artical wise number of shops within the walled city, 1978

| | NAME OF MARKET CENTERS | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fancy | Inner Kumher gate | Kotawali Shopping Centre | Bajaj Bazar | Laxman Mandir Shopping Centre | Dahi Wali gali | Saraffa Bazar | Purana Post Office | Zama Maszid Shopping Centre | Loha Bazar | Ganga Mandir Shopping Centre | Chouburja | Hospital Road | Mathura Gate | Atal Band Mandi | Bassan Gate | Pahi Bagh Shopping Centre | Budh Ki Haat | Delhi Gate Shopping Centre | Purani Sabji Mandi | Inner Gowerdhan Gate | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
| 1. Handi-crafts | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2. General marchandise | 8 | 1 | 8 | 2 | 1 | 1 | 9 | 1 | 5 | 9 | 3 | 3 | 1 | 1 | 11 | 1 | - | - | 2 | - | 67 |
| 3. Watch | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4. spectical | - | - | - | - | - | 1 | - | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 3 |
| 5. Cloth | 7 | 6 | 75 | 5 | 1 | - | 7 | - | 10 | 15 | 13 | 16 | 9 | 2 | 6 | - | 1 | - | - | - | 173 |
| 6. Readymade garments | - | - | - | - | - | 1 | 1 | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 6 |
| 7. Shoe | 4 | 1 | 2 | 2 | - | 3 | 6 | - | 1 | 1 | 1 | 4 | 2 | 1 | 1 | - | - | - | - | - | 29 |
| 8. Studioes | - | 1 | - | - | - | - | - | - | 1 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | 5 |
| 9. Banle | 2 | - | - | - | 1 | - | 2 | - | 1 | - | - | 1 | 1 | - | 2 | - | 2 | - | 1 | - | 13 |
| 10. Bag | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| 11. Glass ware | 1 | 1 | 2 | - | - | - | 1 | - | - | 2 | - | 2 | - | - | 2 | - | - | - | - | - | 11 |
| 12. Cap | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 13. Toys | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 14. Wool | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 15. Saint | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 16. Saraffa | - | - | - | 6 | - | 32 | - | - | - | 1 | - | - | 2 | - | 1 | - | - | - | - | - | 42 |
| Total | 22 | 20 | 88 | 15 | 3 | 39 | 27 | 2. | 20 | 33 | 17 | 27 | 15 | 5 | 23 | 1 | 3 | - | 3 | - | 353 |

## Appendix 4 - E

### Article wise number of shops within walled city, 1978

|  | NAME OF MARKET CENTERS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Miscellaneous | Inner Kumher gate | Kotawali Shopping Centre | Bajaj Bazar | Laxman Mandir Shopping Centre | Dahi Wali gali | Saraffa Bazar | Purana Post Office | Zama Maszid Shopping Centre | Loha Bazar | Ganga Mandir Shopping Centre | Chouburja | Hospital Road | Mathura Gate | Atal Band Mandi | Bassan Gate | Pahi Bagh Shopping Centre | Budh Ki Haat | Delhi Gate Shopping Centre | Purani Sabji Mandi | Inner Gowerdhan Gate | Total |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |  |
| 1. Stationery | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 |
| 2. Books | 2 | - | - | - | - | 5 | 2 | - | - | 2 | 2 | 4 | 1 | - | - | - | - | - | - | - | 18 |
| 3. Machinery | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 3 |
| 4. Kawari | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 |
| 5. Store | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6. Vacant | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7. Machinery Parts | 17 | 2 | - | - | - | - | 1 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | - | 22 |
| 8. Advccate Chember | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9. Prostitute | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 10. Kites | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 |
| 11. Motor Oil | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 12. Lattries ticket | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| 13. Tripal & Bags | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - | - | 2 |
| 14. Band Mater | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | - | - | 2 |
| 15. Kasida Kari | - | - | - | 1 | 1 | - | - | - | - | 1 | - | - | - | - | - | - | 1 | - | 1 | - | 5 |
| 16. Fire Article | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 17. Rough Paper | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 |
| 18. News Paper | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 |
| 19. Seeds | - | - | - | 1 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| 20. Plant | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 21. Medical Store | - | - | 1 | - | - | - | 3 | - | 1 | - | - | - | 8 | - | - | - | - | - | - | - | 13 |
| 22. Type Institute | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 |
| Total | 24 | 3 | 1 | 2 | 1 | 5 | 9 | - | 4 | 4 | 3 | 8 | 12 | - | 3 | - | 2 | - | 1 | - | 82 |

## Appendix 4-F

## Article wise number of shops outside the walled city, 1978

| | NAME OF THE MARKET CENTRES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Household Article | Station Road | Bajeria | Newmadni shop Centre | Outer Mathura gate | Outer Kumher gate | Exhibition road | Outer Gower-dhan road | Newmandi Yard | Malahe | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. Furniture | | | | 1 | | | | | | 1 |
| 2. Electrical goods | | | 1 | 1 | | | | | | 2 |
| 3. Radio | | | | | | | | | | - |
| 4. Crockery | | | | | | | | | | - |
| 5. Cement | | | 1 | | | | | | | 1 |
| 6. Woods | | | 1 | | | | | | | 1 |
| 7. Iron & Hardware | | 1 | | | | | | | | 1 |
| 8. Paints | | | | | | | | | | - |
| 9. Musical instruments | | | | | | | | | | - |
| 10. Stone | | | | | | | | | | - |
| 11. Sports | | | | | | | | | | - |
| 12. Utensil | 1 | | | | | | | | | 1 |
| 13. Coal | | | | 1 | | | | | | 1 |
| 14. Kerosene | | | | | | | | | | - |
| 15. Rop & Ban | | | | | | | | | | - |
| 16. Cycle | | | | | | | | | | - |
| 17. Sewing machine | | | | | | | | | | - |
| 18. Sanitary ware | | | | | | | | | | - |
| 19. soil Article | | | | | | | | | | - |
| 20. Fertilizer | | | | | | 1 | | | | 1 |
| 21. Gas Slinder | | | | | 1 | 1 | | | | 2 |
| 22. Soap | | | | | | | | | | - |
| Total | 1 | 1 | 3 | 3 | 1 | 2 | | | | 11 |

# Appendix 4-G

## Article wise number of shops outside the walled city, 1978

| | | NAME OF THE MARKET CENTRES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Food Articles | Station road | Bajeria | New mandi shop. Cen. | Outer Mathura gate | Outer Kumher gate | Exhibition road | Outer Gowerdhan gate | New mandi yard | Malahe | Total |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. | Grain | 1 | - | 2 | 4 | - | - | - | 63 | - | 70 |
| 2. | Parchuni | 14 | 1 | 6 | 11 | 1 | - | - | - | - | 33 |
| 3. | Namkeen | - | - | 1 | - | - | - | - | - | - | 1 |
| 4. | Wine | 1 | 1 | 2 | 2 | 1 | - | - | - | - | 7 |
| 5. | Sweets | 9 | 3 | 3 | 12 | 2 | - | - | - | - | 31 |
| 6. | Restaurant | 2 | 2 | 1 | 5 | 10 | 8 | - | - | - | 28 |
| 7. | Vegetable | - | - | - | - | - | - | - | - | - | - |
| 8. | Fruits | - | - | - | - | - | - | - | - | - | - |
| 9. | Meat | - | - | - | 1 | - | - | - | - | - | 1 |
| 10. | Pickle & Juce | - | - | - | 1 | - | - | - | - | - | 1 |
| 11. | Ghee & Oil- | - | - | 2 | | - | - | - | - | -2 | |
| 12. | Smoking | 4 | 1 | 3 | 11 | 1 | - | - | - | - | 20 |
| 13. | Hotel | 12 | 1 | 4 | 11 | 2 | 4 | 1 | - | - | 35 |
| 14. | Eating house | - | - | - | - | - | - | - | - | - | - |
| 15. | Bakery | - | - | - | 1 | - | - | - | - | - | 1 |
| 16. | Flour mill4 | 1 | 1 | 3 | - | - | 1 | - | - | 10 | |
| 17. | Gur Bura | - | - | - | 4 | - | - | - | - | - | 4 |
| 18. | Tea store | - | - | - | - | - | - | - | - | - | - |
| 19. | Tabacco | - | - | - | 5 | - | - | - | - | - | 5 |
| 20. | Chat | - | - | - | 2 | - | - | - | - | - | 2 |
| 21. | Ice depot | - | - | - | - | - | - | - | - | - | - |
| 22. | Pansari | - | - | - | 6 | - | - | - | - | - | 6 |
| 23. | Fodder | - | - | - | - | - | - | - | - | - | - |
| 24. | Bhadbhuja | - | - | - | - | - | - | - | - | - | - |
| 25. | Mawa | - | - | - | - | - | - | - | - | - | - |
| | Total | 47 | 10 | 23 | 81 | 17 | 12 | 2 | 63 | - | 225 |

## Appendix 4-H

### Article wise number of shops outside the walled city, 1978

| | | NAME OF THE MARKET CENTRES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Services | Station road | Bajeria | New mandi shop. Cen. | Outer Mathura gate | Outer Kumher gate | Exhibition road | Outer Gowerdhan gate | New mandi yard | Malahe | Total |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. | Hair dresser | 3 | - | 1 | 5 | 2 | 1 | 2 | - | - | 14 |
| 2. | Dryclean | 2 | 1 | - | 4 | - | - | - | - | - | 7 |
| 3. | Tailor | 5 | 2 | 2 | 8 | - | - | - | - | - | 17 |
| 4. | Goldsmith | - | - | - | 1 | - | - | - | - | - | 1 |
| 5. | Blacksmith- | - | - | - | - | 4 | : | - | - | 4 | |
| 6. | Welding | - | - | 1 | - | 5 | 2 | - | - | - | 8 |
| 7. | Typing | - | - | - | - | - | - | - | - | - | - |
| 8. | Dyeing | - | - | - | - | - | - | - | - | - | - |
| 9. | Ginning | - | - | - | 1 | - | - | - | - | - | - |
| 10. | Medical | 1 | - | 3 | 1 | - | - | - | - | | 5 |
| 11. | Dispensary | - | - | - | - | - | - | - | - | - | - |
| 12. | p.press | - | - | - | - | - | - | - | - | - | - |
| 13. | Cyclerepair | 1 | 2 | 1 | 10 | 3 | 1 | - | - | - | 18 |
| 14. | Watch Rep. | 1 | - | 1 | 3 | - | - | - | - | - | 5 |
| 15. | Radio Rep. | - | - | 1 | 1 | - | - | - | - | - | 2 |
| 16. | Mach. Rep | . | 3 | 1 | 6 | - | 16 | 25 | 7 | - | -58 |
| 17. | Tyre retreading | - | - | 1 | - | 2 | 10 | - | - | - | 13 |
| 18. | Carpainte | r- | - | - | - | - | - | - | - | - | - |
| 19. | Sofa Rep. | - | - | - | - | 1 | - | - | - | - | 1 |
| 20. | Kharadwork | - | - | - | - | 2 | 12 | - | - | - | 14 |
| 21. | Transport | - | - | 11 | - | - | - | - | - | - | 11 |
| 22. | Painter | - | - | - | - | - | - | - | - | - | - |
| 23. | Tent house | - | - | - | - | - | - | - | - | - | - |
| 24. | Petrolpump | - | - | 1 | - | 2 | - | - | - | 10 | 13 |
| 25. | Shoe repair | - | - | 1 | 3 | 1 | - | - | - | - | 5 |
| 26. | Commission Agent | - | - | 1 | - | - | - | - | - | - | 1 |
| | Total | 16 | 6 | 31 | 37 | 34 | 55 | 9 | - | 10 | 198 |

## Appendix 4-I

### Article wise number of shops outside the walled city, 1978

| | NAME OF THE MARKET CENTRES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Fancy articles | Station road | Bajeria | New mandi shop. Cen. | Outer Mathura gate | Outer Kumher gate | Exhibition road | Outer Gowerdhan gate | New mandi yard | Malahe | Total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. Handicrafts | - | - | - | - | 1 | - | - | - | - | 1 |
| 2. General marchandise8 | 8 | - | 4 | - | 9 | - | - | - | - | 21 |
| 3. watch | - | - | - | - | - | - | - | - | - | - |
| 4. Spectical | - | - | - | - | 1 | - | - | - | - | 1 |
| 5. Cloth | 2 | 4 | 1 | - | 3 | - | - | - | - | 10 |
| 6. Readymade garments | - | - | - | - | 7 | - | - | - | - | 7 |
| 7. Shoe | - | - | - | - | - | - | - | - | - | - |
| 8. Studios | - | - | - | - | 1 | - | - | - | - | 1 |
| 9. Bangle | 1 | - | - | - | - | - | - | - | - | 1 |
| 10. Bag | - | - | - | - | - | - | - | - | - | - |
| 11. Glass ware- | - | - | - | - | - | - | - | - | - | - |
| 12. Cap | - | - | - | - | - | - | - | - | - | - |
| 13. Toys | - | - | - | - | - | - | - | - | - | - |
| 14. Wool | - | - | - | - | - | - | - | - | - | - |
| 15. Saint | - | - | - | - | - | - | - | - | - | - |
| 16. Saraffa | - | - | - | - | - | - | - | - | - | - |
| Total | 11 | 4 | 5 | - | 22 | - | - | - | - | 42 |

## Appendix 4-J

## Article wise number of shops outside the walled city, 1978

| | | NAME OF THE MARKET CENTRES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S. N. | Misceliencous | Station road | Bajeria | New mandi shop. Cen. | Outer Mathura gate | Outer Kumher gate | Exhibition road | Outer Gowerdhan gate | New mandi yard | Malahe | Total |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 1. | Stationery- | - | - | - | - | - | - | - | - | - | |
| 2. | Books | - | - | - | 3 | - | - | - | - | - | 3 |
| 3. | Machinery | - | - | - | - | - | 12 | - | - | - | 12 |
| 4. | Kawari | - | - | - | - | - | 1 | - | - | - | 1 |
| 5. | Store | - | - | - | - | - | - | - | - | - | - |
| 6. | Vacant | | | | | | | | | | |
| 7. | Machinery parts | - | - | 2 | - | 8 | 23 | - | - | - | 33 |
| 8. | Advocate Chember | - | - | - | - | - | - | - | - | - | - |
| 9. | Prostitute- | - | - | - | - | - | - | - | - | - | - |
| 10. | Kites | - | - | - | - | - | - | - | - | 10 | 10 |
| 11. | Moter Oil | - | - | - | - | - | - | - | - | - | - |
| 12. | Lattries ticket | - | - | - | - | 2 | 5 | - | - | - | 7 |
| 13. | Tripal & Bags | - | - | - | - | - | - | - | - | - | - |
| 14. | Band Master | - | - | - | 1 | - | - | - | - | - | 1 |
| 15. | Kasida Kari | - | - | - | - | - | - | - | - | - | - |
| 16. | Fire articles | - | - | - | - | - | - | - | - | - | - |
| 17. | Rough Paper | - | - | - | - | - | - | - | - | - | - |
| 18. | News Paper | - | - | - | - | - | - | - | - | - | - |
| 19. | Seeds | - | - | - | - | - | - | - | - | - | - |
| 20. | Plants | - | - | - | - | - | 1 | - | - | - | 1 |
| 21. | Medical Store | - | - | 2 | - | - | - | - | - | - | 2 |
| 22. | Type Institute | - | - | - | 2 | - | - | - | - | - | 2 |
| | Total | - | - | 4 | 6 | 10 | 42 | - | - | 10 | 72 |

# APPENDIX (6-A)

## TRAIN TIMINGS
## Broad Gauge Trains, Bharatpur,1980

| Sr. No. | Train No. | Train Name | From | To | Arr. | Dep. |
|---|---|---|---|---|---|---|
| 1. | 19 Dn. | Dehradun exp | Bombay | Dehradun | 01.58 | 02.02 |
| 2. | 51 Dn. | Passenger | Bayana | Mathura | 08.41 | 08.56 |
| 3. | 23 Dn. | Janta Exp. | Bombay | Delhi | 08.02 | 08.07 |
| 4. | 129 Dn. | Parcel | Baroda | Mathura | 10.26 | 10.51 |
| 5. | 3 Dn. | Frontier Mail | Bombay | Amritsar | 15.34 | 15.37 |
| 6. | 55 Dn. | Passenger | Baroda | Mathura | 21.15 | 21.21 |
| 7. | 204.Up. | Dehradun Exp. | Dehradun | Bombay | 01.27 | 01.31 |
| 8. | 564 Up | Passenger | Mathura | Baroda | 06.05 | 06.15 |
| 9. | 44 Up | Frontier Mail | Amritsar | Bombay | 11.41 | 11.44 |
| 10. | 52 Up | Passenger | Mathura | Bayana | 13.20 | 13.30 |
| 11. | 130 Up | Parcel | Mathura | Baroda | 18.05 | 18.20 |
| 12. | 24 Up | Janta Express | Delhi | Bombay | 18.42 | 18.47 |

## Meter Gauge Trains

| Sr. No. | Train No. | Train Name | From | To | Arr. | Dep. |
|---|---|---|---|---|---|---|
| 1. | 6 Dn. | Express | Ahmedabad | Agra Fort | 06.00 | 06.12 |
| 2. | 102 Dn. | Passenger | Bandikui | Agra Fort | 00.01 | 09.09 |
| 3. | 8 Dn. | Fast Passenger | Jodhpur | Agra Fort | 15.27 | 15.35 |
| 4. | 7 Up. | Fast Passenger | Agra Fort | Jodhpur | 11.40 | 11.53 |
| 5. | 101 Up | Passenger | Agra Fort | Bandikui | 18.05 | 18.18 |
| 6. | 6 Up. | Express | Agra Fort | Ahmedabad | 22.07 | 22.15 |

Source : Station Master, Bharatpur.

# APPENDIX 6-B

## Special Amenities and their weightages

*Social Amenities*

| | | Weightage |
|---|---|---|
| 1. *Education* | | |
| (a) Primary School | P | 1.7 |
| (b) Middle School | M | 10.5 |
| (c) High School | H | 135.0 |
| (d) College | C | 540.0 |
| 2. *Medical* | | |
| (a) Dispensaries | D | 17.0 |
| (b) Family Planning Centre | FC | 90.0 |
| (c) Maternity and child welfare centre | MCW | 67.5 |
| (d) Health Centre | HC | 135.0 |
| (e) Hospital | H | 54.0 |
| 3. *Power Supply* | E | 15.0 |
| 4. *Drinking water* | | |
| (a) Well | W | 0.3 |
| (b) Tank | TK | 24.5 |
| (c) Others | O | 17.0 |
| (d) Tube well | TW | 41.5 |
| (e) Tap | T | 180.0 |
| 5. *Communications* | | |
| (a) Kutcha road | KR | 6.3 |
| (b) Pucca road | PR | 3.3 |
| (c) Train | T | 24.5 |
| 6. *Post and Telegraph* | | |
| (a) Post Office | PO | 5.5 |
| (b) Telephone | TL | 108.0 |
| (c) Post and Telegraph | PT | 270.0 |

# APPENDIX 7-A

## Statement showing districtwise abstract giving total number of tanks, Total catchment areas, intercepted, total capacity and average annual irrigation of Ruprail basin.

| S.No. | District | Total number of tanks | Total catchment area in sq.kms. | Total capacity in Mcft. | Total irrigation in hectare |
|---|---|---|---|---|---|
| 1. | Alwar | 31 | 2,242 | 2,976.82 | 7,801 |
| 2. | Bharatpur | | | | |
| a. | Tanks in the catchment area of Ruprail river upto Sikri bund | 1 | 983 | | 10,463 |
| b. | Tank outside the catchment area of Ruprail river (but fed by Ruprail water) | 19 | -- | 474.88 | 5,724 |
| c. | Tanks having independent catch ment area with Ruprail basin. | 14 | 97 | 127.87 | 1,279 |
| | Total | 65 | 3,322 | 3,579.57 | 25,267 |

Source : Irrigation Department of Bharatpur, 1978.

Appendix 7-B

## STATEMENT SHOWING DETAILS OF TANKS IN THE CATCHMENT AREA OF RUPRAIL RIVER

(District Bharatpur)

| S.No | Name of tanks | Tehsil | Total catchment acres in sq. mile | Intercapted in sq. mile | Capacity in Mcft. | Average irrigation in area | Length of bound in chain | No. of sluices regulaters | Discharge capacity through sluices Regulaters. | Cill of R.L sluice | F.T.L | M.WL | Full tank guage in feet | T.B.L. | Total Discharging capacity of water through by wash/ waste weir in cusecs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1. | Sikri bund | Nager | 1,245 | 865.5 | - | 25,855 | 715 | 27 | 1,210 | 90.4 | 102.4 | 104.4 | 11.0 | 107.4 | 3,200 |
| 2. | Kaithwara | " | Fed by Ruprail through Sikri bund | - | 10.0 | 1,118 | 137 | 4 | 30 | 90.5 | 96.7 | 98.0 | 6.2 | 100.7 | 392 |
| 3. | Ramph | " | - | - | 10.00 | 1,068 | 104 | 3 | 25 | 91.0 | 96.0 | 98.0 | 5.0 | 99.0 | 400 |
| 4. | Pathorli | " | - | - | 12.20 | 400 | 180 | 4 | 35 | 90.0 | 97.0 | 98.5 | 7.0 | 100.0 | 600 |
| 5. | Dabak | " | - | - | 7.00 | 975 | 54 | 1 | 40 | 91.0 | 96.9 | 98.0 | 5.2 | 99.9 | 700 |
| 6. | Darawana | " | - | - | 5.00 | 936 | 59 | 2 | 25 | 90.2 | 95.0 | 96.0 | 4.8 | 99.0 | 400 |
| 7. | Kurkain | " | - | - | 7.00 | 160 | 183 | 4 | 25 | 90.3 | 96.1 | 98.0 | 5.7 | 100.0 | 504 |
| 8. | Dehri | " | - | - | 10.00 | 620 | 121 | 1 | 30 | 90.0 | 93.4 | 94.0 | 3.3 | 97.0 | 340 |
| 9. | Biyari | " | - | - | 6.50 | 440 | 166 | 2 | 30 | 90.5 | 97.0 | 98.6 | 6.5 | 100.0 | 540 |
| 10. | Budli | " | - | - | 7.50 | 60 | 35 | 1 | 35 | 88.3 | 96.2 | 98.0 | 9.8 | 99.2 | 180 |
| 11. | Alampur | " | - | - | 15.30 | 1,268 | 187 | 5 | 35 | 90.0 | 96.2 | 98.0 | 6.2 | 99.2 | 750 |
| 12. | Satwari | " | - | - | 13.00 | 600 | 105 | 1 | 40 | 91.0 | 95.4 | 97.0 | 4.5 | 99.5 | 463 |
| 13. | Ahu | Deeg | - | - | 40.00 | 840 | 140 | 1 | 287 | 90.0 | 93.0 | 94.0 | 3.3 | 97.3 | - |
| 14. | Debara | " | - | - | 33.00 | 140 | 73 | 1 | 150 | 94.0 | 99.0 | 101.5 | 5.0 | 104.0 | 140 |
| 15. | Januther | " | - | - | 28.00 | 980 | 140 | 6 | 354 | 95.0 | 101.0 | 103.0 | 6.0 | 108.0 | 3,000 |
| 16. | Kakra | " | - | - | 20.30 | 400 | 48 | 3 | 660 | 92.0 | 101.0 | 103.0 | 9.0 | 106.0 | 3,085 |
| 17. | Kuchawati | " | - | - | 83.00 | 1,900 | 142 | 3 | 962 | 92.0 | 96.3 | 98.9 | 4.5 | 101.8 | 896 |
| 18. | Fanhori | " | - | - | 12.00 | 60 | 40 | - | - | - | 98.0 | 100.0 | 3.0 | 102.5 | - |
| 19. | Shisam | " | - | - | 74.30 | 400 | 248 | 9 | 919 | 93.0 | 99.9 | 100.9 | 6.3 | 104.3 | - |
| 20. | Sahugarh | Kama | - | - | 80.50 | 1,840 | 281 | 2 | 30 | 90.0 | 95.1 | 96.1 | 4.5 | 100.1 | 7,000 |
| 21. | Pepra | Nagar | 4.00 | - | 11.50 | 1,920 | 42 | 1 | 40 | 100.0 | 115.0 | 119.0 | 15.0 | 122.0 | 800 |
| 22. | Chulera | Deeg | 1.50 | - | 9.00 | 60 | 25 | 1 | 367 | 91.0 | 98.0 | 100.0 | 6.0 | 104.0 | 840 |
| 23. | Karruka | " | 4.00 | - | 8.00 | 64 | 35 | 1 | 300 | 105.0 | 110.0 | 114.0 | 5.0 | 117.0 | 4,764 |
| 24. | Nigoni | " | 3.00 | - | 15.40 | 200 | 100 | 2 | 180 | 99.5 | 104.0 | 105.0 | 4.5 | 108.0 | 1,770 |
| 25. | Pasopa | " | 4.00 | - | 30.00 | 230 | 140 | 1 | 128 | 79.5 | 86.0 | 87.0 | 6.5 | 99.0 | 2,000 |
| 26. | Rama Protection | Kama | - | - | - | - | - | - | - | - | - | - | - | -- | - |
| 27. | Sa land | " | 3.00 | - | 8.00 | 64 | 33 | 1 | 441 | 92.4 | 102.0 | 105.0 | 19.6 | 109.0 | 226 |
| 28. | Indraoli | " | 4.00 | - | 5.00 | 20 | 58 | 1 | 95 | 100.0 | 105.0 | 106.0 | 5.0 | 109.0 | 60 |
| 29. | Rol.kherol | " | 3.00 | " | 7.00 | 100 | 15 | 2 | 440 | 99.0 | 107.0 | 109.0 | 8.0 | 112.5 | 19 |
| 30. | Dhau paroli | " | 2.00 | - | 6.40 | 80 | 65 | 3 | 466 | 630.5 | 636.5 | 638.5 | 6.0 | 642.0 | 3,000 |
| 31. |  | " | 7.00 | - | 7.00 | 80 | 19 | 1 | 212 | 100.0 | 160.0 | 130.0 | 7.0 | 116.0 | 1,900 |
| 32. | Agma bund | " | - | - | 6.00 | 100 | 110 | 1 | 40 | 105.0 | 109.5 | 110.5 | 4.5 | 113.0 | - |
| 33. | Garh Ajan | " | 0.55 | - | 4.80 | 12 | 11 | 1 | 53 | 94.0 | 102.0 | 104.5 | 8.0 | 107.0 | 600 |
| 34. | Khora | " | 1.50 | - | 10.00 | 230 | 54 | 1 | 25 | 36.0 | 94.0 | 97.5 | 8.0 | 101.0 | 1,150 |

Appendix 7-C

## STATEMENT SHOWING TANKS OF BHARATPUR DISTRICT OUTSIDE THE CATCHMENT AREA OF RAMGANGA RIVER BUT FED BY RAMGANGA WATER

| S.No | Name of tanks | Tehsil | Total catch ment area in sq. mile | Inter capted in sq. mile | Capacity in Mcft. | Average irrigation in area | Length of bound in chain | No. of sluices regulaters | Discharge capacity through sluices Regulaters. | Cill of R.L sluice | F.T.L | M.W.L | T.B.L. | Full tank guage in feet | Total Discharging capacity of water through by wash/ waste weir in cusecs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1. | Newari | Weir | 1.0 | - | 6.5 | 100 | 40 | 1 | 225.0 | 705.1 | 709.0 | 710.0 | 714.0 | 3.0 | 3,545 |
| 2. | Mawalpura | " | 1.0 | - | 5.2 | 70 | 60 | - | - | - | 726.0 | 728.5 | 734.5 | 5.0 | 2,240 |
| 3. | Khadraya | " | 3.5 | 2.5 | 6.5 | 1200 | 42 | 1 | 225.3 | 708.0 | 711.0 | 712.0 | 716.0 | 2.0 | 1,960 |
| 4. | Mohrnadpur | " | 0.5 | - | 2.5 | 40 | 25 | 1 | 30.0 | 717.5 | 719.5 | 719.5 | 724.5 | 1.5 | 1,960 |
| 5. | Chattarpura | Nadbai | 1.0 | - | 2.4 | 35 | 60 | - | - | - | 670.0 |  | 675.0 | - | 3,959 |
| 6. | Bhadira | " | 1.0 | - | 4.0 | 300 | 20 | - | - | - | 638.6 | 640.5 | 644.0 | - | 5,527 |
| 7. | Pali | Weir | 0.4 | - | 9.2 | 120 | 63 | 1 | 150.0 | 708.0 | 711.5 | 713.5 | 717.0 | 3.5 | 12,365 |
| 8. | Halena upper | " | 1.5 | - | 12.0 | 530 | 45 | 1 | 150.0 | 675.5 | 680.5 | 683.5 | 685.5 | 5.0 | - |
| 9. | Halena lower | " | 2.8 | 1.5 | 8.0 | 140 | 70 | 3 | 450.0 | 674.3 | 679.3 | 280.3 | 683.3 | 5.0 | 5,208 |
| 10. | Naswara | " | 3.0 | 2.0 | 2.0 | 80 | 70 | 1 | 150.0 | 671.0 | 674.0 | 676.5 | 681.5 | 3.0 | 5,208 |
| 11. | Naya Gaon | " | 4.0 | 3.0 | 1.8 | 160 | 62 | 1 | 150.0 | 664.8 | 668.8 | 669.8 | 672.8 | 4.0 | 900 |
| 12. | Aronda | Nadbai | 6.2 | 4.4 | 12.0 | 530 | 60 | 1 | 150.0 | 643.5 | 649.0 | 649.0 | 650.0 | 5.5 | 1,770 |
| 13. | Aronda Handra | " |  | 6.2 | 5.8 | 100 | 47 | 2 | 300.0 | 643.8 | 647.0 | 648.5 | 651.0 | 2.3 | 3,360 |
| 14. | Hantra | " | 7.7 | 7.7 | 15.0 | 400 | 21 | 1 | 150.0 | 643.9 | 647.0 | 648.5 | 651.0 | 3.0 | 1,400 |
| 15. | Dehra | " | 2.1 | 7.7 | 5.9 | 498 | 60 | 4 | 600.0 | 640.7 | 644.0 | 646.0 | 650.0 | 3.3 | 3,389 |
| 16. | Rena | " | 3.5 | 2.1 | 4.0 | 100 | 45 | 1 | 150.0 | 627.2 | 631.0 | 633.0 | 636.0 | 3.8 | 5,546 |
| 17. | Hindola | Bharatpur | 23.5 | 3.5 | 77.4 | 800 | 109 | 2 | 300.0 | 398.0 | 603.0 | 605.0 | 608.0 | 5.0 | 4,754 |
|  |  |  | 1.0 | - | 4.0 | 100 | 78 | - | - | 595.0 | 598.0 | 600.0 | 603.3 | " | " |
| 18. | Sinpinil | " | 32.0 | 24.5 | 42.0 | 720 | 80 | 3 | 450.0 | 590.6 | 594.5 | 597.5 | 600.5 | 4.0 | 6,680 |
| 19. | Halak | " |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 20. | Bhesina | Weir | 1.5 | - | 3.8 | 134 | 55 | 1 | 30.0 | 708.5 | 711.5 | 713.0 | 717.0 | 3.0 | 4,704 |
| 21. | Brijwan | " | 2.5 | 1.5 | 8.0 | 500 | 60 | 1 | 30.0 | 704.5 | 706.5 | 708.0 | 712.0 | 1.5 | 3,948 |
| 22. | Newara | " | 1.0 | - | 2.3 | 225 | 70 | 1 | 154.5 | 702.2 | 703.0 | 704.0 | 708.0 | 0.8 | 3,948 |
| 23. | Nagia Hetram | Nabdai | 0.8 | - | 3.5 | 250 | 30 | 2 | 300.0 | 688.5 | 690.0 | 692.0 | 696.0 | 1.0 | 5,527 |
| 24. | Jahanpur | Weir | 2.0 | - | 17.2 | 270 | 91 | 1 | 150.0 | 688.5 | 693.5 | 695.5 | 688.0 | 4.5 | 4,754 |
| 25. | Sarsena | " | 13.0 | 6.3 | 20.0 | 1,343 | 105 | 3 | 1045.0 | 671.6 | 678.6 | 680.0 | 684.5 | 6.4 | 3,962 |
| 26. | Belara Lower | Nadbi | 1.3 | 0.6 | 2.0 | 50 | 45 | 1 | 140.0 | 643.0 | 644.0 | 646.0 | 649.0 | 1.0 | - |
| 27. | Belara Upper | " | 0.8 | - | 5.0 | 150 | 20 | 1 | 251.9 | 641.0 | 645.0 | 648.5 | 652.5 | 1.5 | - |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28. | Raisia | " | 35.5 | 14.3 | 15.0 | 200 | 110 | 2 | 1297.0 | 620.3 | 627.2 | 629.2 | 633.2 | 7.0 | - |
| 29. | Bansroli | Kumher | 4.0 | - | 22.0 | 461 | 116 | 9 | 1200.0 | 611.5 | 616.5 | 617.5 | 622.5 | | - |
| 30. | Bhatawali | " | 47.0 | 35.0 | 35.0 | 668 | 37 | 8 | 2448.0 | 609.8 | 616.5 | 617.5 | 633.5 | .8 | - |
| 31. | Husena | " | 48.0 | 47.0 | 20.0 | 1,200 | 70 | 2 | 300.0 | 606.0 | 609.0 | 610.0 | 614.0 | 3.0 | 840 |
| 32. | Ajau | " | 54.0 | 48.0 | 89.6 | 1,800 | 138 | 3 | 993.0 | 587.0 | 593.8 | 595.8 | 608.0 | 6.0 | - |
| 33. | Pahuwa | " | 1.0 | - | 40.0 | 300 | 50 | 4 | 1000.0 | 159.8 | 593.8 | 594.8 | 597.8 | 5.0 | - 596.8 |
| 34. | Dhanwara | " | 2.0 | - | 17.5 | 2,230 | 148 | 6 | 900.0 | 583.9 | 591.0 | 592.8 | 596.8 | .1 | - |
| 35. | Helax roondh | " | 67.0 | 57.0 | 7.9 | 700 | 145 | 4 | 1200.0 | 580.3 | 585.3 | 586.3 | 591.3 | 5.0 | - |
| 36. | Seh | " | 72.0 | 62.0 | 65.0 | 1,600 | 44 | 4 | 3300.0 | 570.0 | 570.5 | 581.6 | 583. | 8.0 | - |
| 37. | Borai | " | 137.0 | 134.0 | 19.0 | 200 | 23 | 3 | 3600.0 | 568.2 | 576.3 | 578.0 | 582.3 | 8.0 | - |
| 38. | Bhandore | Bhardpur | 140.5 | 137.5 | 17.0 | 250 | 17 | 5 | 3092.0 | 568.0 | 575.9 | 577.0 | 583.0 | .4 | - |
| 39. | Sewar Lower | " | 2.0 | - | 71.0 | 600 | 125 | 5 | 2470.0 | 582.3 | 587.0 | 590.0 | 593.0 | .0 | 3, 63 |
| 40. | Murwara | " | 4.0 | 2.0 | 122.0 | 2,200 | 120 | 6 | 2080.0 | 581.4 | 586.0 | 588.0 | 592.0 | 5.2 | - |
| 41. | Addi | " | 5.0 | 4.0 | 4.0 | 810 | 20 | 3 | 1200.0 | 579.0 | 586.5 | 588.0 | 592.0 | .5 | - |
| 42. | Motijhil | " | 154.0 | 137.0 | 236.0 | 640 | 185 | 4 | 4060.0 | 565.0 | 574.0 | 577.0 | 580.5 | 8.0 | - |
| 43. | Alipur | Nadbai | 1.0 | - | 5.0 | 50 | 70 | 1 | 150.0 | 733.0 | 737.0 | 739.0 | 743.0 | 3.0 | 3, 170 |
| 44. | Bachamadi | " | 3.6 | 1.0 | 54.0 | 2,500 | 40 | 1 | 92.0 | 616.0 | 623.5 | 626.0 | 624.5 | 7.0 | 2, 436 |
| 45. | Baseri | " | 1.0 | - | 34.0 | 1, 200 | 75 | 1 | 90.0 | 610.0 | 617.0 | 620.0 | 623.1 | 7.0 | 7, 274 |
| 46. | Nekpur | " | 1.8 | - .0 | 70.0 | 800 | 168 | 1 | 150.0 | 603.0 | 608.5 | 608.0 | 615.1 | 5.3 | - |
| 47. | Par | " | 1.5 | - | 12.0 | 400 | 81 | 1 | 150.0 | 599.7 | 598.0 | 600.0 | 603.2 | 3.2 | .593 |
| 48. | Sena | " | 26.5 | - | 56.0 | 2, 000 | 56 | 1 | 150.0 | 608.6 | 612.6 | 614.0 | 618.6 | 4.5 | 6, 680 |
| 49. | Shanpur | " | 1.0 | - | 35.0 | 1, 100 | 120 | 3 | 1200.0 | 628.4 | 635.0 | 637.5 | 640.5 | 6.6 | - |
| 50. | Bhahuwa | Bharatpur | 32.5 | 26.5 | 80.0 | 2, 800 | 75 | 1 | 332.0 | 620.8 | 625.8 | 628.8 | 632.3 | 4.1 | 13, 888 |
| 51. | Sewar upper | " | 68.0 | 39.6 | 200.0 | 1, 800 | 176 | 10 | 1163.0 | 528.0 | 591.5 | 594.4 | 597.0 | 4.5 | - |
| 52. | Sewar Lower | " | 84.0 | 68.0 | 500.0 | 20, 000 | 510 | 15 | 3754.0 | 573.1 | 584.0 | 586.0 | 590.0 | 9.0 | 16, 980 |
| 53. | Anah | " | 1.0 | - | 3.0 | 140 | 52 | 1 | 148.0 | 570.0 | 593.0 | 575.0 | 578.0 | 3.0 | - |
| 54. | Atal Nand | " | 1.0 | - | 4.0 | 400 | 10 | 2 | 97.0 | 560.0 | 564.0 | 565.0 | 570.0 | 4.0 | - |
| 55. | Lalpur Bund | Weir | 144.0 | 132.0 | 260.0 | 1,950 | 154 | 3 | 925.0 | 660.3 | 672.3 | 675.8 | 679.0 | 12.0 | 15, 000 |
| 56. | BAroll | " | 112.0 | 68.9 | 18.0 | 270 | 48 | 1 | 150.0 | 672.0 | 679.0 | 682.0 | 685.0 | 7.0 | 12, 830 |
| 57. | Shunawar | " | 3.7 | - | 12.0 | 280 | 79 | 2 | 300.0 | 671.0 | 674.0 | 680.0 | 683.0 | 1.0 | 1, 602 |
| 58. | Ghari | " | 59.0 | 37.5 | 3.7 | 80 | 31 | 2 | 300.0 | 708.0 | 714.0 | 717.0 | .0 | 6.5 | 9, 115 |
| 59. | Seraj | " | 5.4 | 4.0 | 12.0 | 338 | 30 | 2 | 300.0 | 716.9 | 723.0 | 725.2 | 728.0 | 8.0 | 1, 728 |
| 60. | Ataripur | " | 112.0 | 97.0 | 68.0 | 660 | 174 | 7 | 1050.0 | 686.5 | 693.0 | 797.0 | 700.0 | 6.5 | 19, 245 |
| 61. | Jagiwanpura | " | 0.50 | - | 2.0 | 50 | 35 | 1 | 150.0 | 670.0 | 775.2 | 677.2 | 681.0 | 5.0 | 500 |
| 62. | Bhonds Gaon | " | 1.0 | - | 3.5 | 100 | 67 | 1 | 150.0 | 670.0 | 675.0 | 675.0 | 678.0 | 4.0 | 450 |
| 63. | Muhari | " | 20.0 | 15.5 | 20.0 | 1,480 | 105 | 7 | 750.0 | 668.0 | 675.0 | 677.0 | 681.0 | 7.0 | 500 |
| 64. | Kotapalti | " | 3.0 | .5 | 15.0 | 400 | 45 | 1 | 150.0 | 668.0 | 671.0 | 672.0 | 673.0 | 3.0 | 280 |
| 65. | Raipur | " | 1.5 | - | 6.5 | 120 | 50 | 1 | 150.0 | 670.0 | 674.0 | 679.5 | 683.0 | 9.0 | 1,120 |
| 66. | Bajera Bundoli | " | 4.0 | - | 12.0 | 268 | 66 | 2 | 400.0 | 669.0 | 673.0 | 674.0 | 678.0 | 4.0 | - |
| 67. | Kherbera | " | - | - | 2.5 | 275 | 52 | 2 | 70.0 | 661.0 | 656.0 | 667.5 | 670.0 | 4.0 | - |
| 68. | Behara | " | - | - | - | 350 | 35 | 1 | 70.0 | 612.0 | 617.5 | 619.0 | 623.0 | 5.5 | - |
| 69. | Lakhanpur | " | 1.5 | - | 17.0 | 190 | 30 | 4 | 600.0 | 578.0 | 580.0 | 582.0 | 584.0 | 2.0 | 560 |
| 70. | Raniwala | " | 3.0 | - | 17.0 | 380 | 80 | 5 | 886.0 | 670.0 | 679.0 | 680.0 | 684.0 | 9.0 | 300 |
| 71. | Jaawat | " | 3.11 | - | 22.0 | 431 | 75 | 3 | 500.0 | 660.9 | 668.6 | 672.6 | 675.0 | 8.0 | 3,920 |
| 72. | Bansi | " | 2.5 | - | 15.0 | 400 | 48 | 3 | 550.0 | 650.0 | 656.0 | 659.5 | 663.0 | 6.0 | 3,639 |
| 73. | Dorda | " | 1.6 | - | 6.0 | 300 | 48 | 3 | 445.5 | 668.3 | 674.3 | 676.3 | 680.0 | 6.0 | 600 |
| 74. | Kohri | " | 1.0 | - | 6.0 | 360 | 55 | 3 | 500.0 | 668.0 | 675.0 | 677.0 | 681.0 | 7.0 | 560 |
| 75. | Jatpura | " | 1.1 | - | 3.5 | 140 | 42 | 2 | 300.0 | 653.4 | 657.4 | 659.9 | 663.0 | 4.5 | 6,085 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76. | Luhase | " | 1.7 | - | 10.0 | 232 | 60 | 2 | 120.0 | 615.0 | 656.5 | 659.5 | 663.0 | 5.0 | 360 |
| 77. | Ajronda | " | 2.0 | - | 13.7 | 340 | 58 | 5 | 800.0 | 648.6 | 655.7 | 656.7 | 659.0 | 7.0 | 3, |
| 78. | Jahangirpur | " | 2.0 | - | 50.0 | 348 | 22 | 1 | 150.0 | 641.0 | 642.5 | 645.0 | 648.0 | 1.5 | 17,360 |
| 79. | Naya Ser Khera | " | 2.0 | - | 5.2 | 120 | 40 | - | - | - | 654.0 | 655.0 | 659.0 | - | 560 |
| 80. | Chak Bholapura | " | 1.0 | - | 1.0 | 100 | 30 | - | - | - | 650.0 | 651.0 | 655.0 | - | 840 |
| 81. | Shakpur bund" | - | - | - | 245 | 45 | - | - | - | 699.0 | 647.5 | 650.0 | - | - | |

Appendix 7-D

## STATEMENT SHOWING TANKS OF BHARATPUR DISTRICT OUTSIDE THE CATCHMENT AREA OF GAMBHIR RIVER BUT FED BY GAMBHIR WATER

| S.No | Name of tanks | Tehsil | Total catchment area in sq. mile | Intercepted in sq. mile | Capacity in Mcft. | Average irrigation in acres | Length of bound in chain | No. of sluices regulaters | Discharging capacity through sluices Regulat | Cill of R.L sluice | F.T.L | M.W.L | T.B.L. | Full tank guage in feet | Total Discharging capacity of water through by wash/ waste weir in cusecs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1. | Nathpura | Roopbas | 2.0 | - | 1.3 | 30.0 | 73.0 | 1 | 125.0 | 95.7 | 100.0 | 102.0 | 105.0 | 4.3 | 792 |
| 2. | Dunirai | " | 6.0 | - | 26.0 | 300.0 | 68.0 | 2 | 85.0 | 94.0 | 100.0 | 102.0 | 106.0 | 6.0 | 792 |
| 3. | Khoda Jamadari | " | 6.0 | - | 26.0 | 180.0 | 41.0 | 1 | 125.0 | 94.0 | 100.0 | 102.0 | 106.0 | 6.0 | 192.0 |
| 4. | Khodi Pudawali | " | 6.0 | - | 26.0 | 400.0 | 110.0 | 3 | 340.0 | 94.0 | 100.0 | 102.0 | 105.0 | 6.0 | 3157 |
| 5. | Rajpura | " | 1.3 | - | 6.5 | 400.0 | 39.0 | 1 | 420.0 | 94.0 | 99.0 | 102.0 | 104.0 | 6.5 | 3167 |
| 6. | Lakhanpur | " | 1.0 | - | 5.0 | 70.0 | 45.0 | 1 | 330.0 | 93.0 | 100.0 | 102.0 | 104.0 | 4.0 | 1684 |
| 7. | Sirondh | " | 3.0 | - | 15.0 | 80.0 | 40.0 | 1 | 300.0 | 96.0 | 100.0 | 102.0 | 105.0 | 5.0 | 792 |
| 8. | Ballabhagarh | Weir | 8.6 | - | 17.1 | 1130.10 | 47.0 | 2 | 140.0 | 95.0 | 103.0 | 107.0 | 110.0 | 12.0 | 43 |
| 9. | Kamal Hauj | Bayana | 4.0 | - | 14.0 | 170.0 | 10.0 | 1 | 111.0 | 91.0 | 100.0 | 103.0 | 107.0 | 14.0 | 2240 |
| 10. | Damdama | " | 4.0 | - | 26.0 | 320.0 | 35.0 | 2 | 167.0 | 92.0 | 102.0 | 5.0 | 108.0 | 9.0 | 960 |
| 11. | Kahawar | " | 3.5 | - | 15.0 | 360.0 | 85.0 | 2 | 740.0 | 93.0 | 95.0 | 97.0 | 102.0 | 8.0 | 1584 |
| 12. | Old Kahawar | " | 10.0 | - | 6.0 | 120.0 | - | 2 | 586.0 | 87.0 | 95.0 | 97.0 | 100.0 | - | - |
| 13. | Balm Nagar | " | 10.0 | - | 12.0 | 100.0 | 35.0 | 1 | 457.0 | 87.0 | 102.0 | 110.0 | 108.0 | 9.0 | 9602 |
| 14. | Guthawar | " | 24.0 | - | 38.6 | 160.0 | 40.0 | 1 | 226.0 | 93.0 | 100.0 | 103.0 | 106.0 | 6.0 | 5440 |
| 15. | Bhagoura | " | 1.0 | - | 5.2 | 100.0 | 36.0 | 1 | 1190.0 | 94.0 | 100.0 | 102.0 | 105.0 | 7.0 | 792 |
| 16. | Khatnawli | " | 11.0 | - | 43.0 | -520.0 | 81.0 | 3 | 334.0 | 93.0 | 101.0 | 105.0 | 109.0 | 15.0 | 5321 |
| 17 | Nagla Chitaria | " | 2.0 | - | 20.5 | 5260.0 | 87.4 | 2 | 825.0 | 94.0 | 100.0 | 102.0 | 105.0 | 9.0 | 6480 |
| 18. | Nagla Sheargarh | " | 2.0 | - | 21.0 | 440.0 | 92.5 | 2 | 781.0 | 91.0 | 100.0 | 102.0 | 105.0 | 6.5 | 4454 |
| 19. | Deha Jaon | " | 17.0 | - | 14.0 | 240.0 | 110.0 | 2 | 127.0 | 93.0 | 98.0 | 99.0 | 103.0 | 5.0 | 2240 |
| 20. | Shergarh | " | 1. | - | 8.7 | 80.0 | 35.0 | 1 | 138.0 | 89.0 | 96.0 | 98.0 | 102.0 | 4.5 | 792 |
| 21. | Baratha | " | 70.0 | - | 1860.0 | 7000.0 | 38.0 | 3 | 900.0 | 91.0 | 684.0 | 687.0 | 692.0 | 6.0 | 2078 |
| 22. | Khanwa | " | - | - | 162.0 | 1600.0 | 253.0 | 1 | 364.0 | 678.0 | 589.0 | 597.0 | 600.0 | 9.0 | 9244 |
| 23. | Nahalpur Kachi | " | 1.0 | - | 87.0 | 540.0 | 45.0 | 2 | 366.0 | 580.0 | 589.0 | 593.0 | 599.0 | 6.0 | 6271 |
| 24. | Banda | " | 6.0 | - | 85.0 | 740.0 | 58.0 | 4 | 4099.0 | 583.0 | 590.0 | 591.0 | 594.0 | 7.0 | 650 |
| 25. | AjanUpper | " | 18.0 | - | 90.3 | 800.0 | 150.0 | 2 | 1108.0 | 583.0 | 577.0 | 578.0 | 581.0 | 7.5 | 5984 |
| 26. | Shaurana | " | 4.0 | - | 17.0 | 400.0 | 243.0 | 7 | 346.0 | 569.0 | 577.0 | 589.0 | 582.0 | 7.5 | 4300 |
| 27. | Daulatgarh | " | 5.6 | - | 8.9 | 100.0 | 110.0 | 1 | 439.0 | 570.0 | 574.0 | 576.0 | 569.0 | 6.0 | 6400 |
| 28. | Chak-Chasi | " | 55.0 | - | 72.0 | 1920.0 | 66.0 | 1 | 878.0 | 572.0 | 613.0 | 616.0 | 620.0 | 4.3 | 1455 |
| 29. | Sahntra | " | 6.0 | - | 139.0 | 2360.0 | 160.0 | 3 | 480.0 | 609.0 | 598.0 | 599.0 | 602.0 | 5.0 | 1400 |
| 30. | Richoli | " | 3.0 | - | 42.0 | 2400.0 | 176.0 | 1 | 480.0 | 593.0 | 590.0 | 592.0 | 593.0 | 5.1 | 752 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31. | Kurka | Bayana | 2.0 | - | 61.3 | 1480.0 | 73.0 | 1 | 178.0 | 588.0 | 592.0 | 593.0 | 596.0 | 4.0 | 583 |
| 32. | Gehlau | .. | 6.0 | - | 27.0 | 80.0 | 29.0 | 1 | 84.0 | 587.0 | 592.0 | 593.0 | 596.0 | 5.0 | 280 |
| 33. | Bhot | .. | - | - | 202.0 | 2440.0 | 52.0 | 1 | 254.0 | 545.0 | 552.0 | 558.0 | 560.0 | 7.0 | 11525 |
| 34. | Sukhawali | .. | 2.0 | - | 57.0 | 670.0 | 90.0 | 1 | 128.0 | 551.4 | 558.0 | 560.3 | 564.0 | 7.0 | 1614 |
| 35. | Khundanwada | Roopbas | 5.2 | - | 5.2 | 120.0 | 38.0 | 1 | 242.0 | 70.8 | 83.0 | 95.0 | 100.0 | 3.0 | 1584 |
| 36. | Oasba | .. | 1.5 | - | 10.5 | 150.0 | 60.0 | 1 | 220.0 | 578.2 | 584.5 | 585.5 | 589.0 | 7.0 | 1663 |
| 37. | Barbar | .. | 8.0 | - | 22.0 | 840.0 | 120.0 | 2 | 250.0 | 90.0 | 78.6 | 59.0 | 104.0 | 7.5 | 1120 |
| 38. | Bakoli | .. | 8.0 | - | 58.0 | 220.0 | 78.0 | 2 | 592.0 | 583.0 | 590.0 | 592.0 | 595.0 | 6.0 | 1584 |
| 39. | Daurda | .. | 1.8 | - | 6.0 | 400.0 | 28.0 | 1 | 180.0 | 582.3 | 586.0 | 598.0 | 591.0 | 4.0 | 3167 |
| 40. | Binawa | .. | 1.7 | - | 10.8 | 140.0 | 45.0 | 1 | 132.0 | 95.5 | 100.0 | 598.3 | 106.0 | 5.0 | 792 |
| 41. | Ondal Jat | .. | 4.5 | - | 10.0 | 495.0 | 150.0 | 2 | 2250.0 | 574.0 | 583.0 | 102.0 | 588.0 | 9.0 | 1663 |
| 42. | Kanjar Baroli | .. | 16.0 | - | 635.0 | 1600.0 | 712.0 | 24 | 2302.0 | 573.0 | 584.0 | 585.0 | 590.0 | 11.0 | 18000 |
| 43. | Mertha | .. | 3.1 | - | 3.6 | 442.0 | 9.0 | 2 | 454.0 | 551.4 | 558.0 | 586.0 | 564.0 | 7.0 | 396 |
| 44. | Shakharpur | .. | - | - | 22.6 | 250.0 | 80.0 | 2 | 537.0 | 552.0 | 558.0 | 560.0 | 564.0 | 6.0 | 1584 |
| 45. | Karai | .. | 1.0 | - | 62.1 | 600.0 | 65.0 | - | - | - | - | 560.0 | 562.0 | 6.0 | 2376 |
| 46. | Chainkora | .. | 1.7 | - | 30.1 | 500.0 | 65.0 | 1 | 275.0 | 550.5 | 555.0 | 557.0 | 100.0 | 5.0 | 6446 |
| 47. | Samesara-up | .. | 1.7 | - | 26.1 | 560.0 | 45.0 | 2 | 300.0 | 91.0 | 96.0 | 557.0 | 105.0 | 7.0 | 2910 |
| 48. | Samesra- do | .. | 2.0 | - | 28.6 | 1320.0 | 40.0 | 2 | 1208.0 | 94.7 | 100.0 | 98.0 | 104.0 | 4.0 | 3300 |
| 49. | Bansi burd | .. | 2.4 | - | 18.6 | 110.0 | 41.0 | 1 | 125.0 | 95.5 | 100.0 | 103.0 | 106.0 | 5.4 | 4816 |
| 50. | Kheri burd | .. | 8.0 | - | 29.0 | 538.0 | 112.0 | 3 | 1338.0 | 95.4 | 100.0 | 102.0 | 105.0 | 5.0 | 1128 |
| 51. | Pucca bansi | .. | 1.5 | - | 7.0 | 150.0 | 8.0 | 2 | 120.0 | 95.0 | 100.0 | 103.0 | 578.0 | 5.0 | 6621 |
| 52. | Kaccha bansi | .. | 2.0 | - | 9.0 | 120.0 | 41.0 | 2 | 406.0 | 567.0 | 572.0 | 102.0 | 106.0 | 6.0 | 6261 |
| 53. | Sajjan Bas | .. | 2.4 | - | 18.6 | 110.0 | 73.0 | 2 | 341.0 | 94.9 | 100.0 | 575.0 | 102.0 | 5.0 | 10702 |
| 54. | Maloni upper | .. | 1.0 | - | 3.0 | 120.0 | 35.0 | 1 | 241.0 | 91.4 | 97.0 | 103.0 | 101.0 | 5.0 | 11269 |
| 55. | Maloni Lower | .. | 3.0 | - | 31.0 | 80.0 | 60.0 | 1 | 250.0 | 91.0 | 96.0 | 100.0 | 102.0 | 6.0 | 8232 |
| 56. | Maloni Pura | - | 1.0 | - | 3.0 | 240.0 | 66.0 | 1 | 246.0 | 93.0 | 99.0 | 100.0 | 103.0 | 4.5 | 2182 |
| 57. | Samad Upper | .. | 2.0 | - | 3.0 | 140.0 | 49.0 | 1 | 330.0 | 91.0 | 95.0 | 100.0 | 100.0 | 4.5 | 4390 |
| 58. | Samad Lower | .. | 2.0 | - | 3.0 | 140.0 | 50.0 | 1 | 302.0 | 93.0 | 97.0 | 97.0 | 106.5 | 6.0 | 1400 |
| 59. | Nordha | .. | 2.0 | - | 27.0 | 160.0 | 61.0 | 1 | 190.0 | 89.0 | 92.0 | 96.0 | 102.0 | 4.0 | 2376 |
| 60. | Rundh Samari | .. | 2.0 | - | 11.0 | 200.0 | 50.0 | 1 | 180.0 | 100.0 | 104.0 | 97.1 | 108.0 | 4.5 | 790 |
| 61. | Kheria Upper | .. | 1.0 | - | 9.1 | 100.0 | 34.0 | 1 | 210.0 | 91.5 | 95.0 | 510.0 | 100.0 | 6.0 | 1584 |
| 62. | Kheria Lower | .. | 2.0 | - | 9.0 | 120.0 | 63.0 | 1 | 205.0 | 552.0 | 558.0 | 103.0 | 588.0 | 8.0 | 808 |
| 63. | Khanoorjapur-up | .. | 2.0 | - | 10.0 | 800.0 | 63.0 | 2 | 338.0 | 93.0 | 110.0 | 103.0 | 106.0 | 8.0 | 792 |
| 64. | Khanoorjapur-Lo | .. | 2.0 | - | 26.0 | 440.0 | 15.0 | 1 | 451.0 | 93.5 | 101.0 | -102.0 | 105.0 | 5.6 | 1346 |
| 65. | Nagla Jatmasi | .. | 1.2 | - | 8.0 | 320.0 | 76.0 | 2 | 550.0 | 92.0 | 100.0 | 102.0 | 105.0 | 6.0 | 1200 |
| 66. | Jatmasi bund | .. | 1.0 | - | 9.0 | 80.0 | 75.0 | 2 | 638.0 | 94.0 | 100.0 | 97.0 | 100.0 | 5.0 | 1550 |
| 67. | Jatrauli-up | .. | 1.5 | - | 10.0 | 140.0 | 36.0 | 1 | 2757.0 | 90.0 | 95.0 | 97.0 | 100.0 | 5.0 | 1584 |
| 68. | Jatrauli-Lo | .. | 1.6 | - | 6.3 | 120.0 | 45.0 | 1 | 220.0 | 89.0 | 95.0 | 97.3 | 99.0 | 13.5 | 1455 |
| 69. | Parrwa | Bayana | 12.0 | - | 28.0 | 640.0 | 44.0 | 2 | 705.0 | 81.0 | 94.0 | 102.0 | 105.0 | 5.0 | 1613 |
| 70. | New Kani | .. | 2.0 | - | 11.0 | 80.0 | 41.0 | 1 | 390.0 | 95.0 | 100.0 | 102.0 | 105.0 | 11.5 | 1188 |
| 71. | Bangaria | .. | 1.0 | - | 5.2 | 96.0 | 62.0 | 1 | 206.0 | 88.0 | 100.0 | 102.0 | 105.0 | 8.0 | 5300 |
| 72. | Doondi | .. | 2.0 | - | 26.0 | 240.0 | 70.0 | 1 | 360.0 | 90.0 | 100.0 | 102.0 | 105.0 | 12.0 | 337 |
| 73. | Jaisora | .. | 3.0 | - | 18.0 | 320.0 | 53.0 | 1 | 540.0 | 88.0 | 100.0 | 103.0 | 107.0 | 7.0 | 2280 |
| 74. | Baisora | .. | 2.0 | - | 18.3 | 1241.0 | 27.0 | 1 | 450.0 | 92.0 | 100.6 | 102.0 | 105.0 | 11.0 | 824 |
| 75. | Samantgarh | .. | 2.5 | - | 30.0 | 140.0 | 40.0 | 1 | 264.0 | 89.0 | 100.0 | 102.0 | 105.0 | 5.5 | 158 |
| 76. | Singhrawali | .. | 1.0 | - | 7.1 | 124.0 | 26.0 | 1 | 230.0 | 94.2 | 100.0 | 102.0 | 105.0 | 5.5 | 163 |

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# GLOSSARY

1. *Culture* a total way of life held in common by a group of people, including such learned features as speech, ideology, behaviour, livelihood, technology, and government.
2. *Cultural ecology* The relationship between culture and the physical environment.
3. *Cultural integration* the relationship of different elements within a culture.
4. *Cultural landscape* the man-made landscape; the visible human imprint on the land.
5. *Culture area* an area or region occupied by people who have something in common culturally: a spatial unit that functions politically, socially, or economically as a distinct entity
6. *Ecology* the relationship between an organism and its environment.
7. *Node* in a region, a central point where functions are coordinated and directed,
8. *Time-distance decay* the decrease in acceptance of a cultural innovation with increasing time and distance from its origin.
9. *Decentralization* the movement of households, business, and industry away from the central city.
10. *Cottage (Household) industry* a traditional type of manufacturing in the preindustrial revolution era, practised on a small scale in individual rural households, as a part-time occupation and designed to produce handmade goods for local consumption.
11. *Industrial revolution* a series of inventions and innovations, arising in England in the 1700's which led to the use of machines and inanimate power in the manufacturing process.
12. *Primary industries* industries engaged in the extraction of natural resources, such as agriculture, lumbering, and mining.
13. *Tertiary activity* the distribution of manufactured goods to consumers, the provision of a variety of wholesale, retail, educational, governmental, and medical services along with transportation and communication.
14. *CBD* Central business district of a city.

15. *Decentralizing forces* diffusion forces that encourage people of businesses to locate outside the central city.
16. *Dust dome* a pollution layer over a city that is thickest at the centre of the city.
17. *Social culture area* an area in a city where many of the residents share social traits such as income, education and stage of life.
18. *Townscape* the urban landscape, including the layout of streets and the characteristic structure of buildings.

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